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GENERAL SCIENCE IN THE UNIVERSITY HIGH SCHOOL, EUGENE, OREGON

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It has become more and more apparent with the passing of time that the future for general science in the school curriculum is much more a question of developing a proper pedagogical method of instruction than a matter of what shall form the exact content of such a course. Local situations should play a large part in the latter question, and for the remainder of the material we should look to the immediate environment of the child. There is open to science teachers a splendid opportunity to utilize the heritage of past experience in the teaching of this new subject which has not as yet been formalized by traditions. If general science can call forth a new and more suitable method of presentation, not only is its own future secured, but, what is more important, a service of the greatest value to the teaching of the sciences in general will result.

The past has given us at least two principles which have been quite generally accepted. These are, first, the laboratory approach to science study and, second, the inductive method. Even these, partly for administrative reasons and partly because of failure to realize their values, have been the ideal rather than the actual procedure. Our high schools today are still giving textbook courses

in the sciences with fatal results, as is shown by the steady decline of the special sciences. The laboratory work which accompanies our science courses appears to be quite incidental and subordinate to the use of the textbook.

Looking toward the future we cannot be so certain what will be the guiding principles a few years hence. Perhaps of all the movements in the field of science instruction that toward a wider utilization of the problem method seems to offer the most promise of desirable results. Nevertheless the problem method is far from being developed to a point where most teachers can make much use of this idea. Again it is very likely that to attempt to reduce all teaching to the problem basis would not be for the best. It will require time and careful thought to make the most of this tool, and for the present at least the problem must remain as a standard by which we may occasionally check our results and toward which we may seek to approximate.

To apply these principles to the question of the future of general science, it seems to the writer that the justification or elimination of this new subject depends upon how safely we avoid the error of falling back into the textbook type of course and how skilfully we can make use of the newer types of teaching that are being developed. The general-science course which is an assemblage of chapters from textbooks of the special science is bound to be a hodgepodge, is sure to be superficial and devoid of real vitality, and is destined to prove a failure. It is squarely up to us to develop an adequate technique of presentation in such a beginning course if it is to fill a vital need. A moment's thought will show the futility of hoping to teach much material that has not been taught, time and time again, in the various special sciences.

It is hoped that the course in general science as now given in the University High School, Eugene, Oregon, has in some measure incorporated the best that the past has given as well as some of the present tendencies in general-science teaching. In the main our plan seeks to do three things, as follows:

1. To make the work strictly experimental by using the laboratory approach to all topics. This is then supplemented by a study of textbook materials.

2. To use the inductive method as widely as possible.

3. To incorporate some of the desirable features of the problem method of instruction.

In order to carry out these principles the year's work is organized in fifteen units, which for the lack of a better name are termed problems. It is admitted that these units fall far short of the ideal problem, yet it is hoped that the units approach the ideal somewhat closer than do most units of instruction. Each problem involves the performance of from three to eight or more simple experiments, each of which contributes something to the solution of the question which forms the statement of the problem. Experience has shown that this arrangement of giving all the laboratory work on a topic over a number of consecutive days gives an emphasis and continuity that cannot be had otherwise. The experiment records are all carefully written up in the laboratory, collected, and graded. It has been found that a much higher standard of work can be obtained by grading upon the following basis: Paper on Time, 15 per cent; Neatness, 25 per cent; Accuracy, 30 per cent; Completeness of Statement, 30 per cent.

The work in the laboratory is then followed by a number of days of assigned study or reading. Two texts are used, the selections for this year being Caldwell and Eikenberry, *General Science,* and Pease, *A First Course in General Science.* Supplementary materials are found in various texts of this nature, government publications, and current magazine literature. The following books have been found very helpful: Jewett, *The Next Generation,* which forms the basis of the last four weeks of the course; Olsen, *Pure Foods;* and Stevens, Burkett, and Hill, *Agriculture for Beginners,* for certain problems in agriculture. Home projects, such as the making of a garden, and field trips supplement the work at school. The fifteen units composing the year's work are selected so as to involve the learning of usable knowledge which is full of meaning to the adolescent pupil. The attempt is made to anticipate the questions which are most likely to arise out of the immediate environment of the child. The titles of the problems and the experiments involved in each, together with the time allotted, follow.

FIRST SEMESTER

PROBLEM I. WHAT IS THE EARTH'S PLACE IN THE UNIVERSE?

Experiment 1. What is the relation of the earth to the other planets?
Experiment 2. What is the relation of the earth to the sun and moon?
Experiment 3. What is the cause of the changes of the moon?
Experiment 4. What causes the change from summer to winter?
Experiment 5. How is temperature measured? The thermometer.
Experiment 6. How is heat transferred from one place to another?
Readings: Caldwell and Eikenberry, 11–20; Pease, 13–45, 71–80.
Time: Three weeks.

PROBLEM II. HOW DOES MAN TAKE ADVANTAGE OF THE AIR?

Experiment 1. What are the main facts (properties) about air?
a) Does air occupy space (i.e., have volume)?
b) Can air be made to change its volume (i.e., can it undergo expansion and contraction)?
c) Does air completely fill the space that it appears to occupy (diffusion)?
d) Does air have weight (pressure)?
Experiment 2. How can we measure the pressure of the air? The barometer.
Experiment 3. What fact that we have learned about air is made use of in the siphon?
Experiment 4. What fact about air is concerned in the lift and force pump?
Readings: Caldwell and Eikenberry, 1–12, 49–54, 118–22; Pease, 93–106.
Time: Two weeks.

PROBLEM III. WHAT ARE SOME OF THE LAWS GOVERNING THE WEATHER?

Experiment 1. What is the relation of high and low pressure areas to winds?
Experiment 2. What effect does the rotation of the earth have upon the direction of the winds?
Experiment 3. What are the principal wind zones of the earth?
Experiment 4. Why does dew form and how can we find the dew point?
Experiment 5. What is meant by relative humidity and how can it be determined?
Readings: Caldwell and Eikenberry, 21–48; Pease, 107–118; *The Mentor*, serial number 110, "The Weather," by C. T. Talman.
Time: Two weeks.

PROBLEM IV. HOW DO BODIES OF WATER AFFECT THE CLIMATE?

Experiment 1. Do all substances heat equally?
Experiment 2. How do the Great Lakes affect the climate of the surrounding country?
Experiment 3. What is the effect of the Pacific Ocean on the climate of Oregon?
Readings: Caldwell and Eikenberry, 136–53; Pease, 116–19.
Time: One week.

PROBLEM V. ARE THERE LIVING FORMS IN THE AIR AND WATER?

Experiment 1. What are bacteria and how do they multiply?
Experiment 2. What is the importance of yeasts and molds?

Experiment 3. How are bacteria used in some common industries?
Experiment 4. How are bacteria related to disease?
Experiment 5. How does the septic tank do its work?
Readings: Caldwell and Eikenberry, 79–101, 154–64; *Farmers' Bulletins*, Nos. 490, 473, 449, 155.
Time: Two weeks.

PROBLEM VI. CAN MATTER BE CHANGED FROM ONE FORM INTO ANOTHER?

Experiment 1. What are physical changes?
Experiment 2. What are chemical changes?
Experiment 3. (Optional) What are mixtures?
Experiment 4. Is the burning of a candle a physical or a chemical change?
Experiment 5. Is the action of the electric current upon water a physical or a chemical change?
Experiment 6. What is the nature of the two gases formed by the action of the electric current on water?
Readings: Caldwell and Eikenberry, 55–66; Pease, 46–56, 82–83, 138–45, 147–66.
Time: Two weeks.

PROBLEM VII. WHAT PHYSICAL CHANGES CAN WATER UNDERGO?

Experiment 1. What are the three physical states of matter?
Experiment 2. What is distillation?
Experiment 3. What are the conditions governing evaporation?
Experiment 4. Do plants evaporate water from their leaves?
Experiment 5. Does evaporation affect the temperature?
Experiment 6. What are some common applications of the laws of evaporation?
a) The wet-bulb thermometer (Problem III).
b) Manufacture of artificial ice.
Readings: Caldwell and Eikenberry, 103–17; Pease, 67–70.
Time: Two weeks.

PROBLEM VIII. WHAT USES CAN BE MADE OF THE FACT THAT LIQUIDS EXERT PRESSURE?

Experiment 1. What is meant by buoyancy?
Experiment 2. How can we make use of buoyancy in finding the density of an object?
Experiment 3. How else can the density of a solid be found?
Experiment 4. How can the density of a liquid be found?
Experiment 5. What is the principle of the hydraulic press?
Readings: Caldwell and Eikenberry, 122–35; Pease, 63–67, 81–92.
Time: Three weeks.

SECOND SEMESTER

PROBLEM IX. CAN ENERGY BE CHANGED FROM ONE FORM INTO ANOTHER?

Experiment 1. What is the relation of friction to heat?
Experiment 2. What happens when a rubber rod is rubbed?
Experiment 3. Are there energy changes when a salt dissolves in water?

Experiment 4. What is the nature of magnetism?
Experiment 5. What is the principle of the steam engine?
Experiment 6. (Optional) What is the principle of the gas engine?
Readings: Caldwell and Eikenberry, 180–89; Pease, 79–80, 120–37.
Time: Two weeks.

PROBLEM X. WHAT ARE THE USES OF THE LEVER?

Experiment 1. What are the three classes of levers, and what are the advantages of each?
Experiment 2. What are the uses and advantages of the pulley?
Experiment 3. How do the muscles of our bodies act as levers?
Experiment 4. What is the relation of the lever and pulley to work?
Readings: Caldwell and Eikenberry, 165–69, 170–79; Pease, 56–63.
Time: Two weeks.

PROBLEM XI. WHAT IS THE NATURE OF THE SOIL?

Experiment 1. Does the soil contain water?
Experiment 2. Is there organic matter (humus) in the soil?
Experiment 3. Are there soluble materials in the soil?
Experiment 4. Are there living forms in the soil?
Experiment 5. What makes up the body of the soil?
Summary: The percentage composition of the soil as found in the foregoing analysis.
Readings: Stevens, Burkett, and Hill, 1–26; Caldwell and Eikenberry, 191–226; Pease, 90–92, 167–253.
Time: Three weeks.

NOTE: This problem and the one following are carried out in connection with the planning, planting, and care of a garden as a home project.

PROBLEM XII. HOW DOES THE PLANT GET IN CONTACT WITH ITS SURROUNDINGS?

Experiment 1. How do the roots get in contact with the soil?
a) What are root hairs?
b) What is the nature of osmosis?
c) What is the importance of capillarity?
d) What is the path of ascent of materials in plant stems?
Experiment 2. How does the plant get in contact with the air?
a) What is the structure of the leaf?
b) What is the breathing apparatus of plants?
c) Do leaves take up and throw off gases?
Readings: Stevens, Burkett, and Hill, 27–35; Caldwell and Eikenberry, 67–74; 234–40; Pease, 265–69.
Time: One week.

PROBLEM XIII. HOW DOES THE WORLD GET ITS FOOD SUPPLY?

Experiment 1. How is starch formed in the plant?
Experiment 2. What are the properties of starch?
Experiment 3. What are the waste products in food making?
Experiment 4. What part does diastase play in plants?

Experiment 5. What are the tests for the different foods?
Experiment 6. (Optional) What are some simple ways of detecting adulterations in foods?
Readings: Olsen, 64–68, 74–76, 97–99, 122–40; Pease, 269–73; Caldwell and Eikenberry, 74–78, 241–52, 265–67.
Time: Three weeks.

PROBLEM XIV. WHAT ARE THE CHARACTERISTICS OF LIVING MATTER?

Experiment 1. What is the nature of respiration?
Experiment 2. What is the nature of nutrition?
Experiment 3. What is growth?
Experiment 4. What is the purpose of excretion?
Experiment 5. What responses do plants and animals make to outside influences?
Experiment 6. What is the significance of reproduction?
Readings: Caldwell and Eikenberry, 252–69; Pease, 54–55, 272–75, 282–97.
Time: Two weeks.

PROBLEM XV. WHAT IS THE SIGNIFICANCE OF REPRODUCTION AND INHERITANCE?

Experiment 1. How does Pleurococcus multiply? The yeast plant?
Experiment 2. What is the life-history of the frog?
Experiment 3. How do the flowering plants reproduce?
Experiment 4. What are the stages in the germination of seeds?
Experiment 5. What is meant by variation?
Experiment 6. What do we know of the laws of inheritance?
Readings: Jewett, 1–80, 100–204; Pease, 298–302; Caldwell and Eikenberry, 270–302.
Time: Four weeks.

In order to present the type of class exercises accompanying the problems as worked out in the laboratory, the full outline for class discussion of one of the problems, viz., the last one above, is given here.

PROBLEM XV

A. Simple types of reproduction among the lowest animals and plants (vegetative reproduction)
   1. Budding, e.g., the yeast plant
   2. Splitting, e.g., the bacteria
B. Reproduction by eggs and sperms (sexual reproduction)
   1. Conjugation, e.g., the pond scum
   2. Fertilization, e.g., the frog
   3. Flowering plants
      a) Pollination
      b) Fertilization
      c) Development of the embryo
      d) Germination of the seed
   4. Mammals

C. Meaning of reproduction
   Law: Every animal or plant seeks to reproduce its own kind
D. The "five-linked chain" (Jewett)
   1. Overproduction
      a) The balance of nature
   2. Struggle for existence
   3. Variation
      a) Hybridization
   4. Natural selection or the survival of the fittest
      a) Artificial selection
         (1) Work of Luther Burbank
   5. Heredity
      a) Life-story of Gregor Johann Mendel
      b) The laws worked out by Mendel, as illustrated by
         (1) Sweet peas
         (2) Andalusian chickens
         (3) Feeble-mindedness
      c) The future of the human race
         (1) Environment versus heredity

The references for study given with each problem outline are by no means all of the reading required in some cases, additional lists being issued from time to time. Home experiments are sometimes required and others suggested. Construction and investigation projects are outlined in many cases. Most of the study and reading is done at school under the supervision of the teacher. The class exercises are more of the nature of discussions than recitations of the usual sort. About one day each month is devoted to discussion of any questions which the pupils may bring in, whether arising in the home or at school, the only restrictions being that such topics must have some relation to science in a very broad way.

This course is now given in the Junior third and fourth semesters, which correspond to the eighth grade of the 8–4 plan. The work is constantly in a state of change and is far from being entirely satisfactory. It does, however, in its present form, represent the result of four years' experience of the writer in teaching general science to a large number of pupils.

THE COMMERCIAL CURRICULUM IN SECONDARY SCHOOLS

I. SOME PRESENT CONDITIONS

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Added to the growing interest in business study has come a new interest inspired by the war. In these days a new light has been cast upon almost every phase of social organization, and none has been more clearly illumined than the intimate relation between the problems of citizenship and the problems of business. Far more than before we see the degree in which these problems are the same problems. A natural result of our new vision is a new interest in studies which will clarify our insight regarding the complicated web of business relations which, under the strain of new and vigorous social action, is showing itself so delicate and yet so vital. In view of the events of the past three years it is not presumptuous to declare that, whatever may make the world safe for democracy, nothing less than an electorate enlightened regarding its economic organization can make democracy safe for the world.

In casting about for ways and means—for institutions and agencies that may aid in producing this type of electorate—nothing is more obviously hopeful than the secondary school. Everyone is aware that the number who "go on" each year from high school is so small that what can be expected from the colleges is indeed limited. Making all possible allowance for possible accomplishment in the grammar grades, the function of the high school in training for citizenship, at least under our present school organization, is clear and plain.

In any program purposing to teach the social functions and implications of business, it might well be hoped that the business departments of high schools, wise with experience in business education, would be prepared to lead.

How far are the commercial courses in the American high schools prepared to assume a position of leadership in the work of teaching the basic business structure of society, a knowledge of which is vital to intelligent living and intelligent participation in social activities?

A survey of present commercial courses in high schools justifies some answers to this question.

About the first of February, 1917, the writer, working under the auspices of the School of Commerce and Administration of the University of Chicago, addressed a questionnaire to the principals of 225 high schools throughout the United States.

The high schools were taken from the report of the Commissioner of Education for 1914. To each high school, excepting high schools of commerce, which was listed as having over two hundred pupils in commercial courses, was sent a questionnaire. There were listed in the 1914 report 192 such schools. In addition to these, 33 questionnaires were sent to high schools having between one hundred and fifty and two hundred students.

Of the questionnaires sent out, 136, representing 26 of the 36 states included in the commissioner's report, were returned in time to be included in the tabulations which were made. Of these, 106 came from schools having over two hundred pupils in commercial work. In 20 cases the reports came from schools showing between one hundred and fifty and two hundred students. The reports thus represented returns from over 55 per cent of the schools of the United States which were reported as having over two hundred students in commercial work. The task of answering reasonably well the various questions asked was no small one. Yet a large proportion of the questionnaires were filled out with a care and pains that evidenced a great deal of interest in the inquiry, and this fact gives color to the belief that the data are reasonably reliable.

Commercial courses in the high schools are classified into what are commonly known as the "short course" and the "four-year course." In the material which follows these courses are considered separately.

LENGTH OF THE SHORT COURSE

Fifty-six schools in all, 41.1 per cent of those reporting, declared that a short course was offered. The length of the short course is a very variable quantity. The time ranges from one year to three years, by gradations of one-half year. The two-year course is the most popular of the short courses. Thirty-six of the 56 schools reporting short courses, that is to say 65.4 per cent, reported two-year courses. Table I shows the variation in length of the short courses.

TABLE I

VARIATION IN LENGTHS OF SHORT COURSES IN COMMERCIAL WORK
(56 Schools Reporting)

SCHOOLS REPORTING	LENGTH OF COURSES			
	3 Years	2½ Years	2 Years	1 Year
Number	16	1	35	8
Percentage of total	28.5	1.8	62.5	14.2

REQUIREMENTS OF COMMERCIAL TECHNICAL SUBJECTS

One query called for a list of subjects required of students in the commercial course. In making the tabulations the subjects were grouped according to a classification which will be explained as each group is discussed. The first classification considered was the technical subjects. This term is used to include the courses which train primarily in technical skill. The tabulations here presented refer only to the four-year course. No effort is made to summarize the technical subjects required in short courses. Stenography, typewriting, and bookkeeping predominate in these short courses. These studies are usually arranged in the way that will best fit the length of the course and largely occupy the time which is available. Under such circumstances it is obvious that a tabulation showing the variation in organization would indicate chiefly the varying length of the courses themselves. English—sometimes business English—penmanship, commercial arithmetic, and an elementary science are not infrequently included.[1] Typically,

[1] See Table IV for non-technical subjects in short courses.

however, the curricula are prima facie clerk mills, masquerading under the deluding name of commercial courses.

The technical requirements of the four-year course are set forth in Table II. A study of this table shows what is perhaps a surprising lack of uniformity in the length of time required for technical subjects. Inasmuch as commercial education in American public schools had its beginning in bookkeeping, which was

TABLE II

LENGTH OF TIME REQUIRED FOR TECHNICAL SUBJECTS FOR FOUR-YEAR COMMERCIAL COURSES IN PUBLIC HIGH SCHOOLS

YEARS REQUIRED	BOOKKEEPING		TYPEWRITING		STENOGRAPHY		COMMERCIAL ARITHMETIC	
	Schools Requiring (of 121 Reporting)		Schools Requiring (of 111 Reporting)		Schools Requiring (of 116 Reporting)		Schools Requiring (of 114 Reporting)	
	No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage
½	.....	.....	.....	.....	.....	.....	1	0.8
¾	4	3.3	1	0.9	1	0.8	35	30.7
¼	.....	.....	.....	.....	.....	.....	1	0.8
1	13	11.5	15	13.8	9	7.7	72	63.1
1½	13	10.8	6	5.4	5	4.3	3	2.6
1¾	1	0.83	.....	.....	.....	.....	.....	.....
2	60	49.5	54	86.6	80	68.9	2	1.7
2½	7	5.7	9	8.1	7	6.0	.....	.....
3	17	14.0	22	10.8	11	9.4	.....	.....
3½	1	0.83	1	0.9	1	0.8	.....	.....
4	4	3.3	4	3.6	2	1.7	.....	.....

shortly followed by typewriting and stenography, it might seem reasonable to believe that all matters pertaining to these subjects would be fairly well standardized. As a matter of fact, the table shows that there is considerable lack of uniformity regarding all of them. In teaching bookkeeping, for instance, the reports show that the courses range from one-half year to four years, moving by gradations of one-half year. Two years is clearly the most common period to devote to bookkeeping. Nearly one-half of the 121 schools reporting, 49.5 per cent, have fixed upon two years as the requisite time. The remaining 50 per cent vary widely. Fourteen schools, or 11.5 per cent, report that one year is given to bookkeeping. Nearly as many, 10.8 per cent of the reporting schools, have one-and-one-half-year courses, while a surprisingly large num-

ber, 14 per cent, utilize three years in the teaching of bookkeeping. Four schools, or 3.3 per cent, spread their course over four years, and the same number require only one-half year.

In typewriting the lack of uniformity is not quite so extreme. Of the 111 reporting schools, 86 per cent have fixed upon two years for their typewriting course. In this work again, however, courses vary from one-half year to four years: 13.8 per cent require only a one-year course; 5.4 per cent require typewriting for one and one-half years; slightly over 8 per cent do the work in two and one-half years; 10.8 per cent have a three-year course; and 3.6 per cent have a four-year course in typewriting.

In stenography more emphasis has been put upon the two-year period than in bookkeeping, although the two-year course has apparently not been so generally decided upon as in typewriting. Of 116 schools reporting, 68.9 per cent give two years to stenography, 7.7 per cent give their work in one year, 6 per cent in two and one-half years, 9.4 per cent require three years, and 1.7 per cent four years of training.

A total of 114 schools reported concerning the length of time required in commercial arithmetic. Of these, 72, or 63.1 per cent, give a one-year course. The half-year course is also popular, and is used by 30.7 per cent of the reporting schools. Only 2 schools reported courses in commercial arithmetic extending over a two-year period, and 3 schools require one and one-half years.

The lack of uniformity which exists in the length of courses in these technical subjects, where one naturally expects a considerable degree of standardization, is indicative of the uncertainty that seems to pervade commercial education in high schools. There is some reason to believe that it is administrative reasons that have emphasized the two-year period in bookkeeping, stenography, and typewriting. Business colleges throughout the country give much briefer courses in these technical subjects, and so far as the technical training is concerned they appear to produce a product quite equal to that which graduates from the public high school. There is nothing to indicate that the same work could not be accomplished in as brief a time in high schools. What is perhaps more to the point, there is nothing to indicate that a careful study has

been made to determine the length of time which is necessary for the acquirement of proficiency in these technical subjects. It is common conversation among school people that they fit well into the two-year system, yet the reports indicate that certain schools believe that they can be fitted into other systems. Noticeably lacking is a standard time for courses, based on careful experiment in teaching these technical subjects.

SUBJECTS OTHER THAN TECHNICAL

In considering subjects other than the work in technique, it appeared advisable to consider English separately. One hesitates to classify it as a technical subject, and yet it can hardly be grouped with the distinctly non-technical subjects. Of the 56 schools reporting short courses, 45 gave data on the English requirements in these courses. These data are given in Table III. This report

TABLE III

ENGLISH REQUIREMENTS OF THE SHORT COURSE
(45 Schools Reporting)

3 YEARS		2 YEARS		1 YEAR	
No. of Schools	Percentage	No. of Schools	Percentage	No. of Schools	Percentage
11	24.4	33	73.3	1	2.2

indicates that English is a subject which has secured a place even in courses so largely given to narrow utilitarian uses as the short commercial courses. A comparison of this table with Table I shows some interesting facts. That table indicates that 28.5 per cent of the schools giving short courses have three-year courses. The English data, given above, shows that almost the same percentage, 24.4 per cent, require three years of English. Of the schools reporting short courses, 62.5 per cent give two-year courses. Of the short courses reported, 73.3 per cent require two years of English. Evidently English is usually a required subject throughout the short course.

OTHER NON-TECHNICAL SUBJECTS IN THE SHORT COURSE

A consideration of the non-technical subjects other than English in the short course brings out the lamentable paucity of general

training which is given in these courses and the sorrowfully limited vision with which their graduates enter their life-work in business. In Table IV these non-technical subjects have for convenience been thrown into three groups. Subjects commonly classified as science are grouped together, but the general subjects are put into two groups. One is arbitrarily called "Social-Business Subjects," and is grouped separately because into it are put those general subjects which bear somewhat directly on the social environment of the business man and which are sometimes taught under the direction of commercial departments. The third group is termed the "General Academic" and into it are put all subjects not enumerated in the first two groups.

An examination of Table IV shows, first of all, that the short courses are not planned to do much else than train in technical practice. Of the 56 schools reporting short courses, only 13, or 22.7 per cent, require any general academic subjects; 24, or 42 per cent, require some social-business subject, and some three-quarters require something in the way of science. A closer examination of Table IV, however, reveals the extreme rarity with which any comprehensive demands are made in the fields of general training. Science has apparently made some small claim. Commercial geography, which in this discussion is classed as a science, comes most near to being a universal requirement, and yet it is a requirement in the commercial short courses in but 23 cases, 40 per cent of those reporting. Hygiene or physiology, doubtless owing to state law in many cases, has made a place for itself in 12 of the short courses, or 21 per cent of those reporting. Four schools, 7.1 per cent of those reporting, require physiography. A single school requires general science; one other requires physics or chemistry, and 2 schools require biology. This represents the meager claim which science has been able to make in the short courses, and yet its hold is more substantial than that of any group of subjects. If we turn to the social-business subjects grouped under Table IV, we find that courses of such decidedly business flavor as economics, industrial history, and history of commerce have won almost no recognition. The last two of these are required in 2 instances, which is slightly less than 4 per cent of the schools reporting. Economics is reported as required by only 1 school, 1.7 per cent of

TABLE IV

NON-TECHNICAL SUBJECTS REQUIRED IN THE SHORT COURSES—ENGLISH EXCEPTED

(56 Schools Reporting)

SCIENCE

Commercial Geography*		Hygiene or Physiology		Physiography		General Science		Biology		Physics or Chemistry		Total Schools Requiring Science	
No. of Schools Requiring	Percentage	No. of Schools Requiring	Percentage	No. of Schools Requiring	Percentage	No. of Schools Requiring	Percentage	No. of Schools Requiring	Percentage	No. of Schools Requiring	Percentage	No.	Percentage
23	40	12	21	4	7.1	1	1.7	2	4	1	1.7	43	76

SOCIAL-BUSINESS SUBJECTS

Industrial History*		History of Commerce		Economics†		Civics†		Commercial Law		Local Industry		Total Schools Requiring	
No. of Schools Requiring	Percentage	No. of Schools Requiring	Percentage	No. of Schools Requiring	Percentage	No. of Schools Requiring	Percentage	No. of Schools Requiring	Percentage	No. of Schools Requiring	Percentage	No.	Percentage
2	4	2	4	1	1.7	7	12	10	18	2	4	24	42

GENERAL ACADEMIC

United States History		Mediaeval and Modern History		English History		Algebra		Geometry		Modern Language‡		Total Schools Requiring	
No. of Schools Requiring	Percentage	No. of Schools Requiring	Percentage	No. of Schools Requiring	Percentage	No. of Schools Requiring	Percentage	No. of Schools Requiring	Percentage	No. of Schools Requiring	Percentage	No.	Percentage
4	7.1	1	1.7	1	1.7	1	1.7	1	1.7	5	8.5	13	22.7

* In five other cases commercial geography and industrial history were made optional.

† In one other case civics and economics were optional.

‡ In one other case optional with algebra or history.

those reporting. Commercial law has a somewhat stronger position, as 10 schools, that is, 18 per cent, require this subject. Civics is made a requirement in the short course by 7 schools, and "local industry" is a requirement in 2 schools.

The general academic subjects are hardly noticed by the formulators of short commercial courses. Four of these schools, 7.9 per cent, require United States history, and 5, 8.5 per cent, make some modern-language requirement. Modern and mediaeval history, English history, algebra, and geometry have, respectively, established places as required subjects in only 1 school.

THE FOUR-YEAR COURSE ENGLISH REQUIREMENTS

An examination of the English requirements in the four-year course leads to conclusions similar to those at which one arrives from the study of English in the short courses. Whatever objection against other academic subjects may be advanced by the utilitarian organizers of commercial curricula, it is plain that the need of English is admitted. A total of 115 schools reported on the English requirements in the four-year commercial course, and these reports are summarized in Table V. An examination of

TABLE V

NUMBER OF YEARS OF ENGLISH REQUIRED IN THE FOUR-YEAR COMMERCIAL COURSE
(115 Schools Reporting)

4 YEARS		3½ YEARS		3 YEARS		2 YEARS		1 YEAR	
No. of Schools	Percentage	No. of Schools	Percentage	No. of Schools	Percentage	No. of Schools	Percentage	No. of Schools	Percentage
86	74.7	6	5.2	18	15.6	4	3.4	1	0.8

this table shows that approximately three-fourths of these sc ools have a requirement of four years of English. Slightly over 5 per cent require three and one-half years, and nearly 16 per cent require three years, of English. But a single school limits the requirements in English to one year, and only 4 of the 115 schools reporting limit their English requirements to two years. A totaling of these percentages shows that 94.5 per cent require three years or more of English in the four-year commercial course.

‡ In one other case optional with algebra or history.

OTHER NON-TECHNICAL SUBJECTS IN THE FOUR-YEAR COURSE

Table VI, which presents data gathered concerning the non-technical subjects in the four-year course (English excepted), needs a word or two of introductory explanation. It will be noted that subjects have been classified into three groups:

a) "Subjects Dealing with Physical Environment"

b) "Subjects Dealing Directly with Social Environment of Business"

c) "Other Subjects"

Speaking broadly, these three headings are intended to represent science, social-commercial subjects (such as those considered in Table IV), and the general academic subjects, typically mathematics, language, and history. These headings are used because the first two signify a business point of view from which these non-technical subjects may be regarded. Any individual business enterprise must make an adjustment to the complex social relationship of which it is a part. Such social institutions as the market, financial structures, laws, and business associations combine with a multitude of other mechanisms to make an intricate social environment for a business undertaking. Certain subjects in the curriculum are an aid in making the student aware of this social environment, and in enabling him better to adjust himself to it. Specifically commercial law, civics, industrial history, and economics are perhaps the courses—as courses are now organized—most likely to accomplish these results. It would be presumptuous to assume that these courses are usually taught with the thought that has been suggested above in the mind of the teacher. They are altogether too compartmentalized and separated from one another to accomplish the good which they might. Nevertheless, consciously or unconsciously, they do give the student something of this social environment of business—something of the social-business complex in which lie the duties of a citizen.

In the same way the individual business enterprise deals with the facts of physical science and utilizes them constantly in the conduct of its affairs. Some knowledge of this physical environment to which the individual business enterprise must make an

adjustment is gained through the study of various sciences. Again it would be presumptuous to assume that these are taught from the viewpoint of their functional significance to business. Nevertheless it is impossible to teach these to commercial students without giving them the opportunity of gaining something which may be useful in making an adjustment to physical environment.

Nothing need be said in explanation of the column labeled "Other Subjects." They are, as has been suggested, typically mathematics, language, and history.

TABLE VI

SCHOOLS OFFERING AND REQUIRING NON-TECHNICAL SUBJECTS IN THE FOUR-YEAR COMMERCIAL COURSE, ENGLISH EXCEPTED

(136 Schools Reporting)

	SUBJECTS DEALING WITH PHYSICAL ENVIRONMENT (SCIENCE)		SUBJECTS DEALING DIRECTLY WITH SOCIAL ENVIRONMENT OF BUSINESS (SOCIAL-COMMERCIAL)		OTHER SUBJECTS (GENERAL ACADEMIC)	
	Number	Percentage	Number	Percentage	Number	Percentage
Schools offering to four-year commercial students (136 reporting)	114	83.0	125	91.1	105	77.2
Schools requiring in first and second years (136 reporting)	93*	61.7	30†	22.0	80	59.0
Schools requiring in third and fourth years (123 reporting)	10	8.0	106	86.1	62‡	50.4

* In 63 instances this was commercial geography only.

† The distribution in the first and second years among the subjects considered in this group was as follows:

Industrial history	10 schools	Commercial law	9 schools
Economics	4 "	History of commerce	4 "
Civics	10 "	Local industries	3 "

‡ In 29 cases United States history, or United States history and civics, was the sole requirement.

An examination of Table VI is, at first view, quite heartening to those who hope to see a broader type of education pervading the commercial course. The first column indicates that 114, or 83 per cent, of the schools replying to the questionnaire offer to commercial students courses dealing with the physical environment; 125 offer courses dealing with the social environment; while 105 offer some general academic studies. A more careful analysis,

however, shows that there is no certainty that these subjects will be taken by commercial students. The requirements in these lines of work are noticeably less than the offerings. The requirements have been divided into those which fall in the first and second years and those which fall in the third and fourth years. In the first and second years 61 per cent make some science requirement of commercial students. This is more gratifying before one realizes that in nearly two-thirds of the cases reporting requirements commercial geography is the only science required. In the first and second years only 30 schools, or 22 per cent, require commercial students to take courses dealing with the social environment in which business is conducted. These requirements, as the footnote indicates, are scattered and varied. The significance of these meager requirements in the first and second years is emphasized when one's attention is called to the large number of students in the four-year courses who do not remain in school beyond the second year. The report of the Bureau of Education for 1914–15 regarding the number and percentage of students in each year of high-school courses shows that the condition obtained which is set forth in Table VII.

TABLE VII

NUMBER AND PERCENTAGE OF STUDENTS IN EACH YEAR OF PUBLIC HIGH-SCHOOL COURSES IN SCHOOLS REPORTING, 1914–15

FIRST YEAR		SECOND YEAR		THIRD YEAR		FOURTH YEAR	
Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
543,206	40.86	354,705	26.69	245,380	18.46	185,873	13.99

There are many reasons for believing that in commercial courses the percentage of students who leave during the first and second years is somewhat higher than the averages quoted in Table VII, yet this table indicates that more than 67 per cent of high-school students leave without beginning their third year's work.

In the third and fourth years science requirements fall to the low mark of 8 per cent of the reporting schools. In only 10 of the 136 schools reporting was there a science requirement in the last

two years. The studies in the social-commercial group, however, obtain a noticeable prominence in the third and fourth years. Of the schools reporting, 106, that is, 86.1 per cent, require one or more of the social-commercial groups of studies. In few cases is there much plan or organization shown in these requirements, but it is at least satisfactory to notice that there is a keen realization of the need of this type of work for business students. Apparently the tendency is to crowd this work into the last two years at the expense of science in this period, and at the expense of the first and second year. Science, on the other hand, has its strongest—almost its only—hold in the first two years.

An examination of the general subjects required in the fourth-year commercial course, shows that commercial work and academic training have not established intimate relations. In the first two years 59 per cent of the reporting schools make some requirements, and in the last two years 50 per cent require commercial students to take some general subject or subjects. Usually, however, these requirements are limited, as is shown in the case of the third and the fourth years, in which United States history, or United States history and civics, is the sole requirement.

CONCLUSIONS

Three conclusions are inevitable from a review of the data which we have been considering. The first of these conclusions is that the high-school commercial course is still dominated by heredity. It is still in the grip of its inheritance from the business colleges from which it so largely sprang. Brought into the secondary-school world to compete with private commercial education, fathered in its beginnings almost entirely by the graduates of business colleges, finding its ideals largely in an imitation of its competitors, the high-school commercial course has in great measure remained as it began—a technical training course, giving instruction in mechanical routine. In performing this function it has been encouraged by business men and business conditions. Many characteristics of business growth and change during the past fifty years have been conducive to the persistence of this type of training. The tremendous expansion of business immeasurably

multiplied the demand for clerical performance of what has been called the "facilitating process" of business. This business expansion alone might have been sufficient to keep the commercial courses in their restricted form, but added to this has come a concentration and an increase in the size of business units. The development of this aspect of modern business has decreased the opportunity for the small business entrepreneur as it has increased the opportunities for subordinates. The subordinate positions have, under modern organization, been very considerably routinized. This has been accompanied and aided by an intensive specialization in office work, comparable only to the division of labor in manufacturing processes. Thus the developing aspects of modern business have emphasized in the minds of business managers the need of clerical forces at the same time that increasing size, risk, and complexity have made industrial and commercial undertakings forbidding, if not impossible, to a great number of persons. These conditions have increased the inherent tendency of the high-school commercial course to follow its forbears.

The second conclusion derived from these data, and one that is akin to the first, is that the commercial course has never clearly allied itself with the traditional purposes of American high schools. There has been an attachment, but not a coalescence. The purpose of secondary education has been variously expressed. It has been called general; it has been called cultural; it has been called a training for citizenship. The traditional courses of the high school have been organized into various groups under various heads, but always—poor as the accomplishment may have been—the high-school function has been conceived as one of socialization. In this aim the high-school commercial course has not participated. Bound by its traditions and encouraged by circumstances, it has adhered to its narrow utilitarian ends.

The third conclusion follows from the second. The possibilities of the high-school commercial course, either as a utilitarian or as a social course, have not been realized, or if they have been realized that realization has not been expressed by an adequate organization of work. A conception of business as a vast social enterprise and the teaching of business from this point of view suggest a plan

for a study of society more basic than is attempted in any high-school course or even in the courses of many colleges. Such a conception of business, with the corollary that business technique can be intelligently practiced only with some knowledge of the enterprise as a whole, has nowhere found expression in the organization of commercial courses.

The possible organization of a commercial course based upon such conceptions of business must, however, wait for later consideration.

GERMANY'S EDUCATIONAL FAILURE

JAMES L. McCONAUGHY
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It has been the custom in the United States, until a very few months ago, to praise whole-heartedly all features of German education. An English student of our educational system wrote in 1875: "It is the habit of American educationalists ungrudgingly and with sincere admiration to give the palm to Germany." Various American writers on German education, notably Russell and Farrington, have indicated to us those features in which they thought we might do well to copy Germany. German educational leaders, perhaps themselves propagandists sent by their government, such as Münsterberg and Kerschensteiner, have lauded the educational system of the Fatherland most alluringly. "Germania docet" and the whole world, with the possible exception of France, has open-mindedly learned the lessons she has taught.

The voices of criticism of German education have been few and usually weak. A writer in the *Contemporary Review* twelve years ago stated: "England and America have been flooded with a constantly growing stream of books in praise of German education, but I have failed to discover a single book on the failure of German education, although such a book seems to be very urgently required. It is to be hoped that such a book, pointing out the grave defects of German education, will soon be written." Was it? A few Germans were keen enough to see this failure and comment upon it. Bethmann Hollweg said in the Reichstag in 1911: "The fear that we may not be working along the right lines in the education of our youth is a cause of great anxiety to many people in Germany. We shall not solve this problem by shunning it." American visitors to Germany very seldom even saw the inefficient parts of her school system; they were told about the "hits," but not about the "misses"; they returned lauding German education and criticizing

our own, very seldom pointing out any of the many features in which our education far surpassed that of the Germans. We are just beginning to learn that the Japanese proverb "The bottom of the lighthouse is very dark" applies to Germany's educational system. War is a destroyer; it is also a revealer, and one of the things now most patent to any investigator is that in many features German education is far inferior to ours, and that in scarcely any can we really learn from her by imitating; rather let us be warned by her failures.

An unbiased study of Germany's educational system demonstrates immediately that she has a state-centralized system far better than that of any other country, but that this excellent organization is used for a most pernicious end. There are two sets of schools in Germany, one for the poor, another for the middle class and well-to-do. The first provides eight years of schooling and that is all; the school door is absolutely shut in the face of any child who has completed eight years in the *Volksschule;* for the more fortunate child the other system provides education through the university period. The aim of the *Volksschule* is to provide well-trained, brow-beaten, docile followers; that of the higher schools and universities to provide leaders; furthermore, as the number of leaders desired by those in control of Germany is limited, barriers are placed along the way to decrease the number who complete the university course. The world has never seen a more elaborately organized selective system of education. Plato described such a system as the ideal of a philosopher, Jefferson dreamed of it as a democratic American, while Germany has used it to carry out her aim of aristocracy. The student in the *Volksschule* is not supposed to learn; he merely studies. He is not supposed to think for himself; he is not allowed to go to the libraries. Nothing could be more pernicious to the German mind than a *Volksschule* student who does independent thinking. What Germany wishes this school to turn out is a God-fearing, Kaiser-serving citizen. Unthinking obedience to superiors is the ideal. Naturally then Germany has succeeded better than any other nation in making education compulsory. The *Volksschule*, which has been frequently extolled in comparison with American elementary schools, actually

has the frank aim of accomplishing the spiritual and intellectual slavery of its pupils. Whatever excellencies there may be in the method must be entirely outweighed by the damnable aim. Pestalozzi wisely said that the elementary school must make thinkers as well as followers; otherwise "it can only lead to an artificial and methodical dwarfing of humanity." Few of us realize the frankness with which Prussia's rulers have stated that what Pestalozzi feared was the very aim they desired. Emperor Frederick William in 1799 definitely wrote that *Volksschule* students should never be taught so that they might aspire to higher industrial or social positions than their parents held; "the spirit of the age has aroused in all classes of society an unceasing effort to raise one's self above one's social stratum. . . . . This evil must be strenuously combated if all human relationships are not finally destroyed." The present emperor, in his famous address in December, 1890, stated that the schools "ought with energy to have instructed the growing generation in such a manner as to furnish Me with material with which I can work within the State. . . . . A teacher should do what is demanded from him; he should teach the young and prepare them for resisting all revolutionary aims." It becomes evident then that the aim of the German *Volksschule*, in which 90 per cent of her school population is enrolled, is a brow-beaten proletariat. The growth of socialism in this class in the population, says Paulsen, Germany's greatest educational authority, has made many German leaders urge that this nine-tenths of society receive no education at all in order that it may not have any socialistic aspirations for improving its position or questioning the necessity of obeying its superiors.

The subjects which have been most useful in making puppets of the *Volksschule* students are history and religion. The first is exclusively German, a glorification of German successes and an absolutely untruthful treatment of the history and purposes of all other countries. In Germany history has been prostituted and made to serve the military aims of the state. The teaching of religion is a mere form without any attempt to touch the heart. Its main value to the state is the inculcation of habits of subordination and obedience. Although the Germans teach religion

in their schools vastly more than does any other nation, even before the war they were considered one of the least religious of the civilized peoples. Indeed, so little was religious instruction related to character that they were probably the most immoral of the nations of Europe. Seventy-five years ago Horace Mann was overwhelmed by the amount of vice he saw in Germany. Price Collier wrote more recently: "It has always been the avowed policy of autocracy to atone for the lack of political freedom by lax regulations in regard to moral matters. Drinking, gambling, and other forms of vice are provided comfortably and, comparatively speaking, cheaply." It seems that the formalistic religious instruction in the schools may be justly held accountable for much of the immorality characteristic of Germany before the war, and even probably for the terrible atrocities which her soldiers have perpetrated since. In Macaulay's words, Germany is an example of "high intellectuality with low morality."

The part of the German school system which has been least studied by Americans is the *Volksschule*. Alexander's scholarly work, which has just been published, tells us many things about this school which we did not know and which Germany did not desire us to learn; she preferred that we should concentrate our attention on her higher schools and universities; but the *Volksschule*, enrolling 90 per cent of the school population, is after all the school by which Germany's educational school system should be considered a success or a failure. Germany spends between $15 and $16 each year for each pupil in this school; for the education of each pupil in the higher schools, $70 or over; about one-quarter of the total school expenditure is devoted to train less than one-tenth of the pupils. In America we spend $20.38 for each child of school age (six to eighteen); as not all the children of this age are in the schools, the actual amount spent is probably over $25 per pupil. In our elementary schools we have been working earnestly to decrease the number of pupils per teacher. The average in German elementary schools is 55, in her higher schools, 18. In Prussia in 1912 there were 7,396 classes averaging 165 pupils to a teacher. There was one extreme case of 230 in a class. (It should be remembered that the percentage of enrolment in actual attendance in

Germany is very high, so that the numbers stated indicate the actual size of the class on nearly every school day.) In Prussia 80 is supposed to be the maximum; when one realizes that half of all the schools in Prussia are one-teacher schools and that in each such school the teacher is supposed to cover six years of work, one can draw one's own conclusions about the German schools being supreme. Obviously such a thing as attention to the individual elementary pupil is impossible and unthought of in Germany.

We are sincerely striving to decrease the percentage of retardation in our schools. In the *Volksschule* over 55 per cent of the children are retarded at some time during their course. Out of 1,000 Prussian elementary-school children who had completed eight years in school, 448 had reached (not necessarily completed) the eighth year, 261 the seventh, 181 the sixth, 88 the fifth, 22 the fourth. Nor is this the whole story. The *Volksschule* pupil is required by law to attend school for eight years, from the age of six to fourteen. A very large number of the schools, however, have only six classes; consequently the pupil who is promoted according to schedule spends the last two years of his compulsory school period in going over the work of the two previous years which he has already passed. Of the elementary-school children 4,000,000 are in schools of six or fewer grades; 2,000,000 in schools of seven grades; 500,000, one-fifteenth of the entire school population, in schools that provide eight classes for the eight-year compulsory school period.

The equipment in the average German elementary school would not make the American educator envious. Ventilation is usually entirely lacking; American visitors have suffered from headache and nausea in an atmosphere which is typical of all German schools. Individual seats are almost unknown. Benches are provided, seating from four to eight pupils. The seats, of course, cannot be adapted at all to the needs of the individual child; they are usually only half as wide as the type of seat considered satisfactory in our schools. The average blackboard in a German elementary school is only 4 by 6 feet.

The elementary teacher in Germany is a drillmaster who maintains military discipline in his school, striving to subjugate instead of to educate the pupils, resorting to corporal punishment for the

slightest reasons. The method which he pursues is to lecture to the pupils, requiring them to repeat, usually verbatim, what he has explained. Memoriter work is demanded to an extent that would dumbfound an up-to-date American teacher. Thinking on the part of pupils is not considered necessary. All the teachers are government servants appointed by the government by whom alone they can be removed. Four-fifths of the elementary-school teachers in Germany are men; obviously the education which little girls in the elementary schools receive from this type of teacher cannot seem ideal to an American. The elementary schools are not professionally supervised. Usually the clergy of the community is responsible for seeing that government educational edicts are carried out. Of the supervisors of Prussian elementary schools 67 per cent give only part time to this work; manifestly they are not, in the American sense, professionally trained school directors.

The three types of German secondary schools, which do not correspond to our high schools as they provide practically all the education necessary before admission to the university, have usually received praise from American educational critics. It is in keeping with the German educational ideal, although directly opposed to ours, that only 8 per cent of German pupils of secondary-school age are in school in Germany; with us the figure is 30 per cent. There are only about 1,200 schools to prepare pupils for university work in all Prussia. Probably at least 25 per cent of the pupils in German higher schools are retarded; the German educational officials frankly say that they "prefer to throw a curtain over this." This is a percentage of retardation which would be appalling in an American secondary school. The figures for elimination from school are even worse, at least from our standpoint; the German says quite bluntly, "It is the duty of the school to take measures to prevent ungifted sons of well-to-do families from getting into universities and so on the way toward leading positions." The percentage of pupils in the German secondary schools who complete the work is much smaller than in America, where constant effort is being made to increase the percentage. The pupil who completes six years in a German secondary school may serve in the army for one year as a volunteer; in the *Gymnasium* 25 per cent of the pupils

drop out at this place, in the *Realgymnasium* 35 per cent, and in the *Oberrealschule*, 52 per cent. The total percentage of elimination for all causes before the course is completed is for the schools just mentioned 50 per cent, 80 per cent, and 85 per cent.

The aim of the secondary-school course in Germany is usually not educational; it is military. Russell says, "The average schoolboy seems to consider schooling a necessary evil, something to be endured patiently, resolutely, faithfully, if only thereby he may escape social damnation." This escape is by way of one year's military service as a volunteer, which makes a later career as an officer possible. The lack of physical exercise and play in the German secondary school is striking. Collier states that as a result of this 45 per cent of those who complete the six-year higher-school course are found to be physically unfit for military service.

The German secondary school is a machine run by the state to prepare officers and leaders. The public has no rights in it; it is only under exceptional circumstances that a parent may visit a school; criticisms of the school by the public are unthought of. The teacher is a state official to whom deference is paid by pupil and parent alike.

There is little that the American wishes to imitate in the German universities. They are exclusively professional. There is no such thing as an "arts course" corresponding to our B.A. course. The students are indifferent to their work to an extent startling to an American. Bethmann-Hollweg, objecting to this "know it all" attitude, said to the *Gymnasium* leaders: "Our young people mostly come to the university flabby and flat. Do try to see that they leave for it more ignorant." The German higher school and university give almost no consideration to women, who, according to the German scheme of things as announced by the Kaiser, are to devote themselves to children, church, and kitchen. Coeducation is almost entirely lacking in the higher schools. There are relatively few secondary schools for girls; indeed in all Germany only thirty that prepare for the universities. The total enrolment of women in the universities is about 5,000.

DRAMA AND THE ENGLISH COURSE

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In the usual English course a full measure of achievement is not gained because the literature offered is not a well-organized unit. No one would question the value of most of the individual masterpieces studied—he must question, however, the failure to gain working power in any one year over a significant body of literature. Such procedure has the same weakening effect in mental command over large correlated fields that the nibbling habit has over physical nourishment. There is zest for future achievement in the feeling which a pupil gains when he knows a subject well enough to be able to talk about it freely and intelligently; he has the pride and self-confidence of ownership, a good basis for further acquisition. Attempts to give such unity are occasionally found in courses devoted through whole terms to the literature and thought of a comparatively brief period in its relation to contemporary art and social aspects, and in courses devoted to a particular form of literature. Of these the short story and the drama give greatest opportunity for complete development in the high school. The drama in its many facets offers the greater scope for the all-round training the pupil must get aside from his knowledge of the form studied. Fortunately for such a course, the modern drama is one of the most successful and significant forms of the literature of today. In no other form can one find the social thought, the ethical standards, the better class of popular reactions to life more clearly mirrored. This phase alone makes drama especially suitable to stimulating class discussion. More than that, the diversity of modern drama gives room for a vital introduction of poetry and of the classic, romantic, and realistic points of view; in fact, of all the general principles of literature and art which a high-school graduate must know in the large if he is to have power over his further reading, or

even standards of judgment and a vocabulary in which to express them. Finally the drama seems to the pupil so intimately connected with his own life—because of his inherent interest in dramatic expression rather more than because he sees so many plays or "movies"—that he applies the principles gained in drama study much more quickly to his after-experiences than those which he somewhat somnolently hears expressed in connection with other forms.

In the University High School this year a new course in drama has been formulated. It is in part the outcome of the experience of several years in trying to utilize to a high degree of educational effectiveness the universal desire to give "shows." Students taking this course meet five times a week and receive a year's credit for Senior English. (Such an arrangement is possible because of the relaxed requirements for entrance to most colleges. Those pupils who are to take eastern college examinations receive special training in the few pieces of required literature not covered by the class as a whole.) Under the new plan every bit of the enthusiasm of the pupil for dramatic expression is made use of, not only along the lines of development of drama-producing groups, but also along those of the English and art-craft courses. The course begins with a rapid though intelligent reading of modern drama. The pupils read a play in two days, but can seldom finish discussing it in less than a week unless the points considered are assigned by the instructor and the discussion is limited to them. Each of these first plays represents a different phase of drama. As soon as the class has become acquainted with the field it is to devote itself to tilling, Richard Burton's *How to See a Play* or Elizabeth Hunt's *The Play of Today* is introduced as a textbook and suitable chapters are read in connection with the different plays under discussion. These two books are the most simple and interesting works on the drama for high-school use. The library contains many volumes of the best short plays in English; these are assigned for reading at home on those days when the class is discussing the longer plays already read. By the end of the first six weeks a considerable list is covered. Then the instructor reads others to illustrate the restrictions and possibilities of the one-act form. This feature of

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the course leads to the bringing in of plots, each presented before the class by its author and discussed by the class. When each pupil has at last found a suitable plot and aim and decided with the class aid upon the atmosphere to be maintained, he writes his play. These are read by the instructor and the class decides which are worth presentation. The selected plays are then acted informally without memorizing so that the class may suggest improvements before the lines are committed to memory. All through the rehearsals the play is being reconstructed and lines are being added as they are found to be needed. Much of this work is performed "after hours." This year a class of twenty-eight supplied nine plays worth working over in this way.

If the class has the time, one or two productions are made of well-known plays by professional playwrights. Such activity quickens the interest and crystallizes the critical judgment both in writing plays and in studying them in the classroom. Plays are chosen, so far as possible, so that they give no participant a "star" rôle, and so that several boys and girls may have an opportunity for important characterization. If several casts are made up, every person in the class has a chance to take part. For this aim short plays are often more valuable, as they offer a greater variety of "good" parts than does one long one. The duplication of casts is, of course, a drain upon the time of the instructor, but for the class as a whole it is the excellent plan. There are, of course, enough productions so that each cast has a public performance. These various productions may not have the finish possible when the few most facile actors are chosen, but the pupil remains the important factor rather than the production. Attendance of all members of the class for all rehearsals is not always required, but should occur often because each actor sees his faults and virtues in the work of others taking his rôle and is therefore stimulated to do a little more than his best, and because criticism of those not acting is valuable in building up a finished whole.

The plays studied in the course are chosen with three aims in mind other than the primary purpose of providing the pupils with worth-while literature: (1) to give a knowledge of drama forms, (2) to introduce the great world-dramatists, and (3) to illustrate the

history of drama in outline. As the interest in the work is most easily aroused by modern plays and as it is with modern plays that the pupil will have to live, the playwrights of today receive major attention. The following typical modern plays are mentioned as in no way definitive, but as answering needs of the class:

The Servant in the House, by Charles Rann Kennedy. A sincere and thoroughly dramatic presentation of the question "If Christ came into our modern life?" Its obvious moral quality is a delight to high-school students. It presents at once the serious comedy as a forum for the discussion of ethical problems.

Mary Goes First, by Henry Arthur Jones. A light, clever comedy of manners.

Cyrano de Bergerac, by Edmond Rostand. One of the great dramas of swashbuckling romance.

The Melting Pot, by Israel Zangwill. An excellent melodrama, portraying vigorously the idea so valuable to pupils, "America the melting-pot of the world."

You Never Can Tell, by George Bernard Shaw. An example of the modern comedy of brilliant conversation and stimulating ideas.

Pelleas and Melisande, by Maurice Maeterlinck. A play illustrating poignantly the drama of mood.

The Thunderbolt, by Sir Arthur Pinero. A remarkable comedy for character-study and significant social satire.

Strife, or *The Silver Box*, by John Galsworthy. Studies of the clash of modern social classes; attempts to clarify our vision toward the complex questions arising from conditions today. The character portrayal in these plays gets much attention.

The Doll's House, by Henrik Ibsen. One of the most significant plays in the trend of modern drama, showing the breaking away from eighteenth- and nineteenth-century technique to that of the psychological drama; a play illustrating the "problem" play in the best sense of the word.

Interest in the history of the drama is most easily gained through an appreciation of modern types. After the moderns have been studied for some weeks, the plays of Sheridan and Goldsmith are taken up. *The Rivals* and *She Stoops to Conquer* are selected as most typical of the authors and the spirit of the period. In every case the relation is established between the play and the life and thought of the period. Between the moderns and the mid-eighteenth century there is little in drama in English that is of service to the high-school pupil in his later life. This is likewise

true of the long stretch from Goldsmith to Shakespeare. An explanation of this barren period is attempted by the instructor rather than by students in individual reports or study of a text. The dramatic material of these years may well be left for graduate study. The next plays chosen are perhaps *Macbeth*, the tragedy-in-verse form of earlier days, and *A Midsummer-Night's Dream*, the pageant-comedy of Elizabeth's day, or *Twelfth Night*, a representative comedy, or both. As these plays are in most college-entrance recipes, a double purpose is achieved by such a choice. The masque form is exemplified by another college-entrance requirement, Milton's *Comus*. The latter becomes, if studied with visualization as a spoken entertainment (and this is the point of view cultivated from the beginning of the course), a highly interesting phase of dramatic literature. Few pupils who simply read the masque realize that by sheer entertainment interest it "held the boards" in professional English theaters almost annually for two hundred years and is still occasionally presented.

After the Shakespeare and Milton study (the two being studied as of approximately the same period because the masque form belongs essentially in the Elizabethan age) *Everyman* is read aloud on the school stage by a group of pupils who have spent a few hours in preparation. This gives a vivid idea of the morality. The concluding work in the history of English drama is a series of reports by several students on English religious drama based partly on Miss Bates's able treatment of the subject, and the reading aloud, by those in the class who did not take part in *Everyman*, of the *Second Shepherd's Play*, *Abraham and Isaac*, *Noah's Flood*, and other miracle plays. If at this time the interest of the pupils is not dulled by the older material, a play of Molière is discussed, perhaps *The Learned Ladies*, and individual reports are made on Molière, Goldoni, the *Commedia dell'arte*, and the growth of Pierrot and Columbine, reports largely from Chatfield-Taylor's two works, *Goldoni* and *Molière*. The last play of this survey is a Greek tragedy, probably Euripides' *Medea*, used in the Murray translation and studied in connection with reports by the pupils upon the growth and phases of the Greek theater; the book most frequently used for these reports is Murray's *Euripides*

and His Age. The play is cut and then read with explanations by the instructor.

If at this time there is time for further reading it is devoted to other great figures in modern drama. Two plays of today are taken up at the end of the course so that the relation of the modern drama to its historical background may be doubly impressive. Among the plays which are read at this time and are on the list of reading suggested for the various members of the class are the following:

The Bonds of Interest, by Benavente. A recent Spanish version of the old rogue comedy or picaresque romance.

Five plays by Lord Dunsany. These plays represent the new note of fresh virile imagination which is entering modern drama and modern literature.

The Admirable Crichton, by J. M. Barrie. An excellent, well-made, modern character comedy.

Prunella, by Lawrence Housman. An exquisite modern Pierrot phantasy.

The Honeymoon, by Arnold Bennett. A clever modern comedy with clear-cut characterization.

Milestones, by Bennett and Knoblauch. A brilliant comedy with a new technique; excellent in character and theme.

The Squabbles of Chioggia, by Goldoni. A colloquial comedy of old Italy.

Seven short plays by Lady Gregory. Best modern types of the short form.

The Younger Generation, by Stanley Houghton. Successful modern comedy of ideas and character.

A Thousand Years Ago, by Percy MacKaye. Oriental phantasy of power and beauty.

The Piper, by Josephine Peabody. One of the few poetic dramas of today of real power.

Swanwhite, by August Strindberg. An exquisite, virile fairy play.

If the time permits at the end of the course a week is devoted to other literature than drama to see whether the principles of appreciation and technique carry over into new fields, and to show how the same large principles underlie all forms of art. This enlarges the horizon of the pupil perceptibly by making him feel that he has acquired real understanding of far-reaching basic principles.

The written work of the course takes its initiative from other features of the class work. It has considerable variety, though the greater part of it is expository, dealing with subjects upon which

the class has in its recitations (one should say discussions, for of formal recitation there is little) shown tense interest. At the beginning of the course, after considerable attention in class, the pupils write a theme on the somewhat difficult assignment, "Why is a work of art a work of art?" Each pupil chooses not more than five reasons, each of which is developed at length with concrete illustrations. After these have been read and criticized an informal tabulation of the reasons accepted by the class is made as material to be treasured by the class. The next written assignment requires the pupils to apply these same principles to drama and to add what they consider the special elements of worth-while drama. These themes too are read to the class for discussion and for tabulated principles. From this time on the class work or tangent class criticism develops more subjects than can be used. The "movies" give much material. Are the "movies" to be considered art? is a question of real interest, though it may not appeal to the readers as such. Many of the pupils go often to the moving-picture theaters and are eager to justify themselves; the others like to attack the "fans." If after the themes are read the class decides that "movies" are not art, and they usually do when reasons for and against confront them, they are asked to attempt to justify the "movies" on other grounds. This theme in especial usually brings out surprisingly straight thinking. In all assignments of a somewhat abstract character the emphasis is put upon a few ideas, each well developed and illustrated in at least one long paragraph. Reasons not strong enough to be so treated are reserved for class criticism. Reviews of plays read or seen, or points of view differing from those of critics studied, form a considerable portion of the written work. In reviews only a small part of the entire theme may be devoted to the story, and that part must illustrate a point that the reviewer is making. Informal argument arises over discussions of character. Strangely enough some pupils usually are enthusiastic over justifying Mr. Crampton in *You Never Can Tell*, and others are equally ready to prove Shaw wrong in his attitude toward the obligations of children to their parents. *The Doll's House* provokes the query, "Is there an American 'Doll's House'?" or "Is Nora justified in her final decision?" Many short themes

are written on scenes or costumes that the pupils are planning or on theaters or settings that they have seen.

It is taken for granted that Seniors know the mechanism of writing. If a pupil shows weakness in any branch he is given individual attention outside of class so that the majority need not be held back. At the beginning of the year great care is taken to weed out quickly those who have registered for the course but are not clearly fitted to take it. Work of this kind can be pursued to advantage only in a class evenly graded. Many a pupil, however, who has a weak record will put forth redoubled energy and care in order to remain in a class in which so live a subject as modern drama is treated. It is true, too, that the genuine interest of the pupils gives a new thoughtfulness and a surprising accuracy to their work. The amount of unsolicited written work as well as of reading is astonishing. One boy whose written material has been peculiarly slovenly and cramped in other years, is expert in electrical and woodshop work. Now that he is constantly explaining and making stages for the class his themes have become mature and accurate. Another lad who in one week wrote an extra review of a play seen and read two unassigned Ibsen plays was heard to remark in the halls to a fellow-student that the latter should take the drama course, for it was a snap. The speaker had just spent a considerable portion of his Christmas holiday in making an elaborate stage equipped with screens and furniture. At least twice, the second time to put into practice the principles, especially that of proportion, gained from the discussion of the first, pupils retell the story of a play. Even though warned, in the first attempt the pupil will probably not so tell his story that the thread of the main plot will stand out or the last acts get due amount of space. The only other narrative is that contained in the original plots submitted for projected plays. In all the written work the main, though by no means the entire, emphasis is placed upon full, well-rounded thought-development. In the second half of the year time unrelated to the drama work is devoted to effective sentence-construction and to diction.

There is constant work in oral expression, subject always to class criticism. Articles on stagecraft, new plays, playwrights, or new

theater schemes are given in summarized form. Occasionally a theme subject is used for a long talk before the class. In this work the clearness and fulness of the speaker's outline get attention. At least two rather formal talks are made before the class by each pupil. The first is a review of a chapter or article on some phase of dramaturgy. The speaker outlines the author's ideas, emphasizing those points which he thinks most valuable to the class. These he discusses with considerable fulness. At the end he answers any questions of information or argument that the class may ask. Such talks average fifteen to twenty minutes in length. Through them several books on the drama are covered with interest and intelligence. William Archer's *Playmaking*, assigned to the more able students, is thus brought before the class in its entirety, though it is too difficult for a general textbook. The second formal talk is the presentation of the life, the work, and a critical valuation of a single dramatist. The subjects for this effort are assigned early in the year, though the talk is not given for some months. Liberal excerpts are read from the works of the playwright treated to illustrate points made, and bibliographical references are carefully given. The talks usually last, with the discussion following, for at least one full period.

A few times during the year, when particularly suitable plays are being presented in the city, the class is asked to attend them. As soon as all have seen a play the pupils bring the criticisms of it from the daily papers, which they have been asked to save, and the various points of view are discussed. In this way the pupils become acquainted with the caliber of the various local critics and are led to formulate standards for dramatic criticism. Later each pupil writes criticisms of the plays he sees. Whenever a pupil has attended a new performance of any merit he gives the class his opinion of it and his advice as to whether the others should see it. It is required of the speakers that they develop their points with concrete examples. This questioning of one's own standards of enjoyment usually awakens the pupil to a new valuation of his recreation. In connection with this same phase of the work magazine criticism of the play seen can often be found. Through this the reliable critics of the country are discovered and the class comes

easily to know where to look for information and advice about the theaters. Unfortunately, so far as the value of magazines is concerned, the effective criticism is not found in the periodicals most helpful in general to the pupils. The work of Clayton Hamilton and of Walter Pritchard Eaton is especially worth while to the youthful theater enthusiast.

Young people as a rule have no sincere standards of their own regarding theater-going, nor indeed regarding their reading. What standards they may profess are usually the artificial ones adopted from, or forced upon them by, their instructors and parents. Such young people are, however, peculiarly sensitive to ridicule. If the ridicule comes in book form it loses its unpleasant personal tone, but leaves its principle all the more clearly impressed. As a consequence, such a book as that of George Jean Nathan, the New York reviewer, *Another Book on the Theatre*, though for mature consumption and perhaps of no great worth, can be used effectively in the classroom. His parodies and burlesques of the cheaper forms of modern entertainment occasionally read to the class by the instructor are productive of both merriment and serious thought. Little work done in the class has accomplished in the time given it so much toward giving the pupil standards. In a similar way some of Stephen Leacock's humorous skits invite classroom use.

Educational associations are making a valiant effort to improve the long-neglected American speaking voice. A successful experiment in the drama class indicates one way toward progress. Before a play is put into rehearsal, when interest is especially intense, each pupil is asked to prepare for reading before the class a passage which can be obtained in phonographic records. After several pupils have read the selection and been criticized by the class, the record is played. Then comparisons are made between the professional and the student reading. Later other students read, then the class reads with the phonograph once or twice, and finally individuals read with it. During the ensuing weeks from time to time other similar exercises are undertaken. The records at present available are not wholly satisfactory, though they are very helpful; the talking-machine companies are, however, planning new ones made by actors whose diction sets the standard of American speech.

In these lessons the class is always tensely alert and thus ready to receive permanent impressions. They see at once their failure to grasp the author's full idea and intention, or their ineffectiveness in giving to the listeners his idea with its proper subordinations of thought; they thus gain a new sense of the value of idea-emphasis by word-emphasis. And they really comprehend, often for the first time, the power and beauty of rhythmic phrasing, whether in every-day prose or in verse. Here the need of slow, clear enunciation, of distinct syllables, and the use of pause gain a new dignity in their minds.

The physical equipment for such a course as has been described need not be great, though it should contain certain elements, notably a stage with a frontage of at least sixteen feet, a set of screens, and an adequate lighting system. Preferably the stage should be in the classroom, now a workroom, for much of the discussion can be illustrated by concrete examples, and the pupils will come to consider the stage work as part of their daily experience and not a sensational adventure. There is too a camaraderie and an actual unity of purpose in a class working under such conditions that is difficult to maintain in the formal classroom and the formal audience hall. In any case the theater room should not be large, at the maximum seating less than five hundred people; in a large hall all the naturalness and simple sincerity quickly vanish. There is a world of difference in educational value between the work which is the natural result of classroom effort and the occasionally excellent *tour de force* arising from the excitement of a single production.

The usual scenery in high-school presentations is artistically shocking; a cheaply painted outdoor set, suggesting in its traceries the lace of a bedraggled petticoat rather than God's own trees, and an indoor set which a doll's house would put to shame. As an inexpensive substitute for these the writer has successfully used nine screens. These are made five feet wide by ten feet high, of a light frame covered on both sides with burlap, one side in a dark smoke-blue and the other in a putty color. They can be attached to one another easily, and so attached will stand solidly if set at a slight angle. One screen has an arched opening which is readily converted into a heavy door of the same burlap, or into a French

door, or into a lattice window. If other entrances are needed they are supplied by openings between the screens. Such screens can be purchased from any carpenter for one hundred to one hundred and fifty dollars, or can be made in the school shops.

Most stages are equipped with overhead lights and footlights. Neither is indispensable, though both aid. What one must have are at least two strong movable lights, preferably those known as bunch lights, and strip lights. With these and a few gelatine color slides, red, blue, and amber, which cost about fifty cents each, one can throw the lights from any angle and get most delicate *nuances* of color. A system of dimmers by which each light can be turned on or off gradually is not a necessity, but a very great aid to varied effects. The electric equipment should not cost more than one hundred and fifty dollars even in large cities. The cost of the apparatus itself is a fraction of this figure; it is the installation which increases the expense.

An alert class, stimulated by magazine pictures of the best staging of the modern school, such as that of Gordon Craig, Max Reinhardt, Granville Barker, Robert Jones, or Raymond Johnson, will work out, under direction, settings of surprising freshness and beauty. They must be impressed at the outset, however, with the first principle of modern staging, that there can be nothing on the stage not significant in the tone, or period, or action of the play. In such simple staging every detail must convey the impression desired. A class was recently confronted with the necessity of presenting a goose girl with her geese in the garden of a princess. This was a poser. At last a solution was reached. At one side of the proscenium arch a silhouette tree branch of beaver board swept gracefully downward and across two-thirds of the arch. This was balanced by a silhouette tree trunk on the other side at the back between two screens. A formal wall was indicated by rectangles of beaver board with an opening between, on each side of which were small, highly conventionalized bay trees of beaver board, indicating the entrance to the palace. The geese? They appeared as a cream-white dado about the screens. In this case, as in most cases, the neutral color of the screens became mere distance or background. The audience was not conscious of them, for they

served merely as a means of emphasizing the significance of the properties.

A king's walled garden was ably suggested by placing against the blue screens: (1) a white statue (from the art department) on a long packing-box painted white, the whole set between two small fir trees at the back; (2) two white pillars for the gateway at an entrance between screens at one rear corner; (3) a long white packing-box bench with a small fir tree at each end; (4) a flight of steps at the other front end, the steps placed at the side near the footlights, receding behind the curtain. A few window boxes from the various classrooms formed a low border of greenery along the base of the screens. The steps, bench, and pillars were made for a few dollars by the boys in the school shops. If screens are not to be secured, similar effects can be obtained against a permanent hanging of fulled drapery. This should hang from rods above the line of vision of the spectators, should cover the three walls of the stage completely, should be made in separate sections to permit entrance from any point, and should move easily on the rods. Amateurs who use draperies often fail utterly because the drapery is allowed to become mussy or spotted. Such a setting requires absolute neatness and accuracy and a greater significance and conventionalization of the properties than does any other type. A safe color for the draperies is a warm gray, as this takes colored light effects easily.

The habit of enjoyable reading of plays requires a visualization which nearly all pupils possess, though it is perhaps latent. This power, which is a powerful asset in almost every form of reading, can be stimulated by arousing in the pupils a feeling for stage settings. The play becomes a living reality if they see the characters moving vividly across a realized background. Thus settings for scenes read receive considerable attention, and usually without definite assignment pupils bring in their ideas. Since the planning or discussing of a setting necessitates the closest attention to the underlying mood of the scene as well as to the physical needs of the actors, one of the aims of the instructor is gained without artificial effort on his part: the pupil must know his play or he is "out of it" as far as scenery is concerned. The ability to sense the accurate

atmosphere of reading-matter—poem, essay, drama, or editorial—is a valuable asset. The work in settings, of course, lends real assistance to the graphic-art department in vitalizing and freshening the attitude of the pupils toward their work. In the present course settings for the plays to be produced are discussed both in the drama class and in the art classes, and those pupils who are in both departments form an informal committee to transfer ideas back and forth, the art department carrying the ideas into execution. This same relationship is maintained between the drama class and the costume-design class, the latter shaping its course toward the planning and purchasing of materials and the making of the costumes needed. Similar co-operation is entered into with the shops and the music department when aid is needed. Each element is considered by the class in its relation to a real unity in the production.

To further the interest of the pupils in settings and to give initial information needed to support such interest, early in the year a "gallery committee" is appointed. This group receives and mounts on large cards of a uniform size all scene, stage, theater, and costume designs of significance which the pupils can find. No pictures of actors or actresses are included unless in some way they represent a pertinent phase of artistic stage production. In late years the better class of illustrated magazines has printed much valuable material of this kind. Colored covers and other decorative materials not intended for the stage are often stimulating As this gallery continues through the years it should form a collection of interest far beyond the school precincts.

Another branch of class activity allied closely to the gallery is the making of small stages. Each pupil at the beginning of the second term builds for himself a stage. These are usually made from packing boxes mounted on legs and painted. A pasteboard proscenium arch hides the intimate workings behind the scenes. The stage is set with screens or draperies. Later each pupil reads a different play and makes a setting suited to it. The rivalry in this undertaking is provocative of remarkable results. One boy interested in electricity and lighting effects made a Fortuny dome stage and equipped it electrically for demonstrations before the

class. When the class progress permits the time, stories are written suited to production as puppet plays or shadow plays. After the work has been done on modern stages the class is sufficiently familiar with this *métier* that it can visualize at once historic types of stages, the Elizabethan, the middle-Italian, and the Grecian, and can discuss intelligently the advantages and disadvantages of each and its relation to the type of play presented. Occasionally pupils interested in "making things" attempt miniature reproductions of each of the types studied.

At the end of the course the pupils have been concerned in a practical application of all the arts and crafts of the school; they have had considerable experience in presenting effectively before the class material which they have themselves organized; they have spent many hours in creative work ending in an approach to professional fruition; they have read several volumes of solid critical writing; they have studied twelve plays in class and have read at least twenty more; they have held live discussions on many of the vital problems of the day; they have formed standards for the appreciation of all the arts; and they have gone a long way toward the mastery of the technique, not only of reading and writing drama, but of rapid, intelligent reading of all types of literature.

COSTS OF INSTRUCTION IN THE HIGH SCHOOLS OF WEST VIRGINIA[1]

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THE METHOD OF THE INVESTIGATION

In September, 1916, a questionnaire was mailed to the 75 high schools in West Virginia which were listed in the *Educational Directory* of the state superintendent of free schools for 1915–16 as high schools of the first class. These are four-year high schools with courses of study, equipment, and quality of instruction of such nature as to warrant their being considered as a homogeneous group. By this means the following information was secured from 57 high schools:

1. Name of high school..... 2. Location.....
3. Number of students enrolled.....
4. Salary of superintendent..... 5. Salary of principal.....
6. Length of school term.....
7. Number of classes taught by superintendent.....
8. Number of classes taught by principal....

In addition to the foregoing the following information was secured for each of the various subjects:

a) Total number of pupils taking the subject
b) Number of classes, or class divisions
c) Length of recitation period
d) Number of times a class meets each week
e) Total cost of instruction in the subject

Certain aspects of the method of deriving the total cost of instruction in a subject are perhaps worthy of attention. In the first place, no account was taken of such activities as keeping study-hall or holding conference periods. It has been the experience and

[1] The present article is based on a Master's thesis which was submitted by the writer to the University of Chicago in March, 1917. It purports to give no more than a brief summary of the method of the investigation, of the treatment of the data, and of the conclusions.

observation of the writer that these activities have not yet become problems of much importance in the internal organization of the high schools in West Virginia. It was assumed, therefore, that these activities were a part of each teacher's work and that they were fairly evenly distributed among the teachers of a given school; it was also assumed that were these activities taken into consideration costs would be uniformly decreased in all the subjects in all the high schools.

Secondly, the cost of instruction in a subject was computed on the basis of the course unit rather than on the basis of the time unit. That is to say, if a teacher of mathematics and science was conducting two classes for periods of 45 minutes each in the former subject and two classes for periods of 60 minutes each in the latter, his salary was apportioned equally between the two subjects. The reason for this was that the credit received by a pupil who does a year's work in mathematics is the same as that which is received by him in a year's work in science. The assumption was made that the "unit" of instruction is of equal importance in either subject, and that the teacher renders the same service to the school and the community in teaching a course in mathematics as in teaching a course in science.

The method of computing the cost per unit of instruction.—For purposes of comparison the cost of instruction in each subject was computed in terms of cost rate per 1,000 student-hours, that is, one student attending class for 1,000 hours. The method was as follows: The length of class-period was reduced to a fraction of an hour and multiplied by the number of class meetings each week times the number of weeks in the school year. This product, which represents the length of time the class meets during the year, times the number of students taking the subject gives the total number of student-hours of instruction. Reducing to thousand student-hours and dividing into the total cost of instruction in the subject gives the cost of 1,000 student-hours of instruction in that subject.

THE COST OF 1,000 STUDENT-HOURS OF INSTRUCTION

The cost of 1,000 student-hours of instruction in each of the various subjects is shown for each high school in Table I. From

this table it may be noted that the variation in cost for equal amounts of instruction in the same subject among the various high schools as well as for equal amounts of instruction in different subjects within the same high school is most striking. We note that Bluefield is paying for 1,000 student-hours of instruction in English $42.18, and that for the same amount of instruction Benwood is paying approximately one and one-half times as much, and East Bank twice as much. The figures do not justify the assumption that the quality of the instruction in Benwood is 50 per cent superior to that given in Bluefield, or that it is 25 per cent inferior to that given in East Bank. In all probability the quality of the instruction in the three high schools is approximately equal. On the basis of the quality of the instruction given the three high schools have been accorded equal recognition in the classification by the state department of education, and their graduates are received on equal terms by the state university. Variation in the cost for equal amounts of instruction in modern language, Latin, and mathematics is still more apparent than in English, while the variation in cost among the various subjects in the same high school needs hardly to be pointed out.

THE IMPORTANCE OF THE FACTORS WHICH DETERMINE THE COST OF INSTRUCTION

The factors which determine the cost of instruction have been already indicated in the description of the method of computing the unit cost of a given subject. They comprise (1) the time devoted to the subject, (2) the salary of the teacher and the number of classes per teacher, and (3) the number of students taking the subject. Variations in unit costs among a number of high schools or within the same high school are determined by variations in one or more of these three factors. To increase the salary of the teacher is to produce a corresponding increase in the cost of instruction, while an increase in the time devoted to a subject or in the number of students taking the subject results in either case in a corresponding decrease in cost. The factor of largest significance is not the one whose influence is greatest in determining costs—the three factors exert equal influence in this respect—but the factor

TABLE I

THE COST OF 1,000 STUDENT-HOURS OF INSTRUCTION IN EACH OF THE VARIOUS SUBJECTS

School	English	Modern Language	Latin	Mathematics	Science	Agriculture	History	Commercial Subjects	Household Occupations	Shopwork	Normal Training
Belington	$ 52.08	$130.21	$ 77.77	$ 45.05	$ 53.33	.....	$ 51.19	.....	.....	.....	.....
Benwood	66.85	59.26	222.22	110.30	88.89	.....	38.52	$111.10	$118.52	.....	.....
Bluefield	42.18	41.15	36.14	36.48	42.54	.....	32.21	68.91	42.61	$ 69.44	.....
Buckhannon	44.70	47.62	47.62	42.49	31.95	$ 51.28	48.03	.....	32.45	.....	.....
Ceredo	46.17	75.56	118.31	61.83	56.67	.....	92.34	113.33	90.66	.....	.....
Chester	44.74	101.33	93.33	50.00	71.07	.....	53.33	.....	.....	.....	.....
Clarksburg	45.09	64.99	52.29	44.44	32.77	61.43	41.67	59.52	47.47	38.99	.....
Clay County	74.56	98.76	134.61	87.16	40.48	211.64	115.23	.....	86.67	61.73	$111.11
Clendenin	43.48	101.50	67.57	47.24	54.01	.....	53.28	.....	57.87	.....	.....
Davis	52.17	92.75	28.83	38.09	53.34	.....	69.74	120.00	42.09	51.85	.....
East Bank	88.88	74.08	78.41	55.55	71.89	80.81	104.58	.....	74.07	.....	.....
Edgewood	34.15	65.91	54.59	55.56	39.67	205.07	50.04	67.51	48.86	39.52	.....
Elkins	54.52	50.27	47.25	48.91	39.71	.....	48.00	.....	60.27	32.79	.....
Fairmont	53.61	40.88	45.36	30.38	43.26	31.15	33.68	89.69	55.72	50.00	.....
Fairview	82.69	61.73	185.18	91.17	108.41	168.35	107.44	No data	.....	.....	.....
Farmington	53.51	125.49	76.19	55.56	53.73	.....	72.29	.....	95.75	.....	.....
Grafton	36.05	50.12	109.09	50.39	36.56	30.87	39.76	48.80	58.03	.....	.....
Hillsboro	61.54	80.00	.....	99.53	94.28	113.96	130.38	92.59	112.28	.....	202.02
Hinton	39.22	53.68	52.09	51.34	51.85	37.67	40.04	.....	60.60	95.24	148.15
Keyser	44.61	66.67	40.82	46.29	39.65	105.82	25.73	No data	No data	No data	.....
Mannington	51.81	54.24	77.97	66.67	59.15	.....	63.85	.....	75.97	116.40	.....
Martinsburg	31.82	75.00	56.25	48.75	46.88	.....	46.25	75.00	.....	.....	.....
Morgantown	49.11	63.79	58.46	53.23	68.71	.....	54.12	64.90	48.61	46.51	.....
Moundsville	43.12	53.76	54.51	48.41	55.56	.....	51.61	80.81	.....	.....	.....
Nicholas County	50.37	.....	35.42	59.13	30.27	92.59	44.67	.....	93.20	72.69	108.11
New Martinsville	40.99	80.00	56.25	69.83	55.56	40.28	47.68	83.33	30.18	.....	.....
Oak Hill	32.00	80.00	45.71	50.56	47.62	69.44	22.22	.....	83.87	No data	56.66
Parkersburg	57.92	65.91	79.14	63.45	56.25	.....	71.48	39.05	46.99	92.85	73.71
Parsons	38.09	41.48	113.33	31.11	108.39	98.77	49.97	130.74	47.22	70.83	211.64
Piedmont	46.03	135.94	130.86	46.96	31.87	.....	71.60	46.69	230.16	.....	.....
Point Pleasant	62.75	83.95	118.52	52.29	82.96	.....	60.27	No data	No data	.....	.....
Princeton	39.35	42.74	107.53	48.46	49.36	.....	50.11	67.34	117.88	.....	.....
Ravenswood	38.55	75.55	58.22	56.69	48.98	.....	40.82	.....	.....	.....	.....
Richwood	39.22	52.27	39.47	70.61	58.48	46.29	54.90	41.06	.....	.....	No data
St. Albans	76.54	131.11	100.31	51.85	65.84	.....	115.00	66.67	128.00	141.67	.....
St. Marys	39.51	66.67	117.65	57.14	39.89	74.75	66.31	.....	.....	.....	.....
Salem	55.43	63.68	120.54	46.77	68.18	246.91	138.88	83.33	53.57	.....	.....
Shinnston	58.45	47.06	67.85	54.32	60.28	208.33	80.00	.....	63.33	76.92	.....
Sistersville	36.44	43.29	38.85	51.80	48.13	.....	41.85	.....	.....	.....	.....
Spencer	43.32	58.96	65.48	44.33	73.89	48.08	55.56	95.48	69.44	No data	104.16
Sutton	39.04	.....	85.72	49.38	44.44	No data	36.36	.....	41.15	98.76	161.03
Thomas	41.15	81.02	85.46	45.01	78.50	32.79	34.12	199.08	74.91	76.10	.....
Webster Springs	95.69	150.00	120.14	98.70	74.07	.....	74.56	46.27	187.50	208.33	294.64
Welch	51.66	61.66	90.65	58.33	48.41	.....	52.31	133.33	88.88	.....	.....
Wellsburg	50.00	57.22	85.03	66.13	58.65	.....	108.33	150.00	90.00	51.00	.....
West Milford	107.78	.....	150.00	102.56	170.94	246.91	118.94	.....	.....	.....	.....
Williamson	85.09	.....	70.37	41.82	48.02	.....	84.54	256.19	100.00	105.22	.....
Williamstown	61.19	161.11	59.97	50.79	70.49	68.15	60.38	.....	.....	.....	.....

whose variation is greatest either within the same high school or among a number of high schools.

Considering then variation as the criterion of significance, it becomes clearly evident that the time devoted to a given subject is of very little importance in determining the cost of 1,000 student-hours of instruction in a given high school, or of explaining the wide variation in cost among a number of high schools. To show what relation exists between the cost of 1,000 student-hours of instruction in a subject and the time devoted to it Table II is here presented, which shows the relationship for English and science, the two subjects in which, respectively, there exists the least and the widest variation in length of recitation period.

For convenience the high schools have been divided for each subject into six groups of eight each in the order of the prices paid per 1,000 student-hours of instruction in each subject. The first half of the table should be read: The average cost per 1,000 student-hours of instruction in English in the eight high schools which pay the highest prices for English instruction is $84.76; the average length of recitation period in the same high schools is 45 minutes; the average cost in the second group of eight high schools is $58.18; and so on. The second half of the table, which gives the data for science, should be read in the same way.

TABLE II

THE RELATION BETWEEN THE COST OF 1,000 STUDENT-HOURS OF INSTRUCTION IN ENGLISH AND SCIENCE AND THEIR RESPECTIVE PERIOD LENGTHS

ENGLISH			SCIENCE		
Group	Average Cost per 1,000 Student-Hours	Average Length of Recitation Period (in Minutes)	Group	Average Cost per 1,000 Student-Hours	Average Length of Recitation Period (in Minutes)
1.....	$84.76	45	1.....	$100.80	46
2.....	58.18	45	2.....	68.79	53
3.....	51.45	44	3.....	56.79	56
4.....	44.77	44	4.....	50.89	50
5.....	40.59	45	5.....	44.14	56
6.....	35.77	50	6.....	35.31	67

The lack of relationship between the cost of instruction in English and the time devoted to it is evident. For the subject of sci-

ence a certain relationship is found to exist; it is of such a nature, however, as to warrant the conclusion that the time devoted to a subject is a negligible factor in determining the price which a community pays for instruction.

The relation between unit costs in English and the average salary of teachers is shown in Table III. The high schools are shown grouped with reference to two co-ordinates, of which one provides the scale of cost per 1,000 student-hours of instruction, and the other the scale of the average salary of teachers. The

TABLE III

THE RELATION BETWEEN THE COST OF 1,000 STUDENT-HOURS OF INSTRUCTION IN ENGLISH AND THE AVERAGE SALARY OF TEACHERS

Cost of 1,000 Student-Hours (in Dollars)	Average Salary of Teachers (in Dollars)									
	675 to 700	700 to 725	725 to 750	750 to 775	775 to 800	800 to 825	825 to 850	850 to 875	875 to 900	900 to 925
30– 35	.....	1	.....	.....	.....	2	.....	.....	.....	.....
35– 40	.....	2	.....	2	.....	4	.....	.....	.....	.....
40– 45	2	4	.....	2	.....	.....	.....	1	.....	.....
45– 50	.....	.....	.....	2	.....	.....	1	.....	1	.....
50– 55	.....	2	.....	3	.....	2	.....	1	.....	.....
55– 60	.....	.....	.....	1	.....	.....	.....	2	.....	.....
60– 65	.....	2	1	.....	.....	.....	.....	.....	.....	.....
65– 70	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
70– 75	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
75– 80	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
80– 85	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
85– 90	.....	1	.....	.....	.....	.....	.....	.....	.....	1
90– 95	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
95–100	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
100–105	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
105–110	.....	.....	.....	.....	.....	1	.....	.....	.....	.....

table shows in a very striking way the lack of relationship between the salary of the teacher and the cost of a subject. It is clearly evident that the salary of the teacher is a factor of minor importance in determining the cost of instruction. In the table 14 high schools are indicated as paying the same average salary to their English teachers—$700 to $725—and getting their English instruction at rates which vary from $30 to $90 per 1,000 student-hours. Likewise 13 high schools are indicated as paying their English teachers salaries ranging from $675 to $900, which are at the

same time getting equal amounts of English instruction at practically the same rate—$40 to $50. One is struck by the fact, even upon a cursory examination of the table, that the actual salary paid to teachers is no reliable index of the price which a community is paying for instruction.

Tables IV and V show the relations, respectively, (1) between the cost per 1,000 student-hours of instruction and cost per class, and (2) between the cost per 1,000 student-hours of instruction and the average size of classes for the subject of English. Table IV

TABLE IV

THE RELATION BETWEEN THE COST OF 1,000 STUDENT-HOURS OF INSTRUCTION IN ENGLISH AND THE COST PER CLASS

Cost of 1,000 Student-Hours (in Dollars)	Cost per Class (in Dollars)													
	110 to 120	120 to 130	130 to 140	140 to 150	150 to 160	160 to 170	170 to 180	180 to 190	190 to 200	200 to 210	210 to 220	220 to 230	230 to 240	240 to 250
30– 35	....	....	2	1	....	....	....	....	....	....	....	....	....	....
35– 40	....	3	....	3	....	1	....	1	1	....	....	....	....	....
40– 45	1	3	1	2	2	....	....	....	....	....	....	....	....	....
45– 50	....	....	....	2	....	1	1	....	....	....	....	....	....	....
50– 55	1	1	....	....	2	2	....	3	....	....	....	....	....	....
55– 60	....	....	....	....	....	1	....	....	1	1	....	....	....	....
60– 65	....	....	....	3	....	....	....	....	....	....	....	....	....	....
65– 70	....	....	....	....	....	1	....	....	....	....	....	....	....	....
70– 75	....	....	....	....	1	....	....	....	....	....	....	....	....	....
75– 80	....	....	....	....	1	....	....	....	....	....	....	....	....	....
80– 85	....	....	....	....	....	....	....	....	....	....	....	....	....	1
85– 90	....	....	....	....	....	1	....	1	....	....	....	....	....	....
90– 95	....	....	....	....	....	....	....	....	....	....	....	....	....	....
95–100	....	....	....	....	....	1	....	....	....	....	....	....	....	....
100–105	....	....	....	....	....	....	....	....	....	....	....	....	....	....
105–110	....	....	....	1	....	....	....	....	....	....	....	....	....	....

shows the 37 high schools which are paying less than $60 per 1,000 student-hours grouping themselves in somewhat regular order along a diagonal extending from the upper left-hand corner of the table to the lower right-hand corner. For the 11 high schools which are paying more than $60 per 1,000 student-hours no relationship appears to exist between the cost of instruction and the cost per class. The former fact may be taken to indicate that within rather wide limits the cost of instruction in English increases as the cost per class increases.

Turning to Table V we find very clear evidence of relationship between the size of classes and cost of instruction. We find the high schools, as represented in the table, approximating with a marked degree of regularity a diagonal from the lower left-hand corner of the table to the upper right-hand corner, showing that as the size of classes increases the cost of instruction tends to decrease.

TABLE V

THE RELATION BETWEEN THE COST OF 1,000 STUDENT-HOURS OF INSTRUCTION IN ENGLISH AND THE AVERAGE SIZE OF CLASSES

Cost of 1,000 Student-Hours (in Dollars)	Average Size of Classes												
	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35
30– 35	....	....	....	....	....	....	....	1	....	1	1	....	....
35– 40	....	....	....	....	....	....	1	3	1	1	1	1	1
40– 45	....	....	....	....	....	2	2	1	4	....	....	....	....
45– 50	....	....	....	....	....	....	2	1	....	1	....	....	....
50– 55	....	....	....	....	1	1	4	3	....	....	....	....	....
55– 60	....	....	....	....	....	1	....	....	1	1	....	....	....
60– 65	....	....	....	2	1	....	....	....	....	....	....	....	....
65– 70	....	....	....	....	1	....	....	....	....	....	....	....	....
70– 75	....	....	1	....	....	....	....	....	....	....	....	....	....
75– 80	....	....	1	....	....	....	....	....	....	....	....	....	....
80– 85	....	....	....	....	....	....	1	....	....	....	....	....	....
85– 90	....	....	2	....	....	....	....	....	....	....	....	....	....
90– 95	....	....	....	....	....	....	....	....	....	....	....	....	....
95–100	....	....	1	....	....	....	....	....	....	....	....	....	....
100–105	....	....	....	....	....	....	....	....	....	....	....	....	....
105–110	1	....	....	....	....	....	....	....	....	....	....	....	....

Tabulations similar to Tables IV and V have been made out for each subject, but space does not permit their reproduction here. Tabulations similar to Table III have been made out only for the subjects of English, mathematics, science, and household occupations. The reason for this was that in the high schools of West Virginia a teacher is usually a teacher of more than one subject, and that of the eleven subjects under consideration the four mentioned above are the only ones which show a tendency to differentiate as special-teacher subjects.

The correlation ratios have been computed for each tabulation. These are not reproduced because it was found that while a correlation ratio is of value in indicating the relationship between two variables it cannot be used by itself to determine the importance

of such relationship. One is obliged in every case to inspect the original tabulations and to draw his conclusions from the facts which are there portrayed.

The importance of enrolment as a factor in determining the cost of instruction.—The dependence of size of classes and cost of instruction upon the enrolment of the school is shown in Table VI. Here the high schools have been grouped, according to size, into six groups of eight each, and the median size of classes and the median cost per 1,000 student-hours of instruction have been determined for each group in the so-called required subjects. These comprise English, mathematics, science, and history, and are so designated because some work in each is required for graduation in every high school. The table should be read: In the eight high schools whose range of enrolment is 50 to 75 the median size of classes is 15 and the median cost per 1,000 student-hours is $74; and so on. The

TABLE VI

THE DEPENDENCE UPON TOTAL ENROLMENT OF SIZE OF CLASSES AND COST OF INSTRUCTION IN THE SO-CALLED REQUIRED SUBJECTS

Group	Range of Enrolment	Median Size of Classes	Median Cost per 1,000 Student-Hours
1	50– 75	15	$74
2	76– 91	20	61
3	93–118	23	52
4	120–147	23	50
5	152–256	23	48
6	275–690	25	44

table indicates that in some degree size of classes and cost of instruction are dependent upon the total enrolment of the school. The conclusion may be drawn that the enrolment of a school, when it is greater than 90 to 100, is a relatively unimportant factor in determining the size of classes and the cost of instruction; when the enrolment falls below 90 to 100 it becomes a factor of importance and presents a difficult problem to the administrator who is seeking to perfect an efficient organization.

STANDARDS

In determining the standard cost of 1,000 student-hours of instruction in the various subjects for the 48 high schools reported

in this study, the following assumptions were made: (1) that exceptional schools, or schools which are paying unusual prices for instruction, should be excluded from consideration in setting up standard costs; (2) that standard costs should emphasize an increase in the salaries of teachers.

The following method was used in determining the standard for each subject. Those high schools in which the cost in a given subject was determined in part by unusually small size of classes, or in part by the fact that classes in the subject were taught by the principal or superintendent who draws an administrative salary, were considered "exceptional" schools and their presence was not taken into consideration in determining the standard cost in that subject.[1] Excluding the exceptional schools, the average price paid per 1,000 student-hours of instruction in a given subject by the upper half of the schools—that is, the half which pay the highest prices—was taken as the standard cost for that subject.

Table VII gives for each subject the number of schools giving courses and the numbers which were and which were not considered

TABLE VII

STANDARD COSTS OF 1,000 STUDENT-HOURS' INSTRUCTION IN VARIOUS SUBJECTS

Subject	No. of Schools Giving Courses in the Subject	No. of Schools Not Considered	No. of Schools Considered	Standard Cost per 1,000 Student-Hours*
English	48	5	43	$62
Modern language	44	16	28	70
Latin	47	23	24	64
Mathematics	48	15	33	60
Science	48	14	34	64
Agriculture	23	14	9	57 (?)
History	48	17	31	60
Commercial subjects	26	17	9	60 (?)
Household occupations	35	16	19	70
Shopwork	20	11	9	67 (?)
Normal training	10	9	1	.....

* Following are given the costs per class of sizes indicated, when the rate is $65 per 1,000 student-hours and the class meets five times each week for 36 weeks for periods of 45 minutes each:

Size of Class	Cost per Class
15	$132
20	175
25	219

[1] The accepted size of classes was fifteen or larger; $1,000 and over was considered an administrative salary. The methods of determination are reported in the original study.

in deriving the standard cost. The standard cost for each subject—the average of the prices paid by the upper half of the schools considered—is shown in the last column. The standards for agriculture, commercial subjects, and shopwork are not to be taken as significant, since in each case the standard was determined by the prices paid by only four schools. No standard is given for normal training; it is obvious that one school should not determine the standard for the state.

The validity of standards.—The standards which have been set up for the various subjects should not be considered as rigid and unvarying. In the first place, no reason is apparent why the standard for mathematics should be $10 less than the standard for modern language, nor is there any apparent reason why the standard for household occupations should be $10 more than the standard for history. The seven standards which may be considered as significant—those for English, modern language, Latin, mathematics, science, history, and household occupations—may be taken to define the limits within which should fall the standards for these subjects and for the subjects of agriculture, commercial subjects, shopwork, and normal training as well. The conclusion may be drawn that the standard cost of 1,000 student-hours of instruction, set up with the double purpose in view of improving the organization of classes and raising the salaries of teachers in the first-class high schools of West Virginia, falls somewhere between $60 and $70. Schools which are paying prices higher than the standard, because of small size of classes in some subjects, should cut down their costs by improving their internal organization; schools which are paying less, because of low salaries of teachers, should increase their costs by paying their teachers higher salaries.

Secondly, what may be considered the standard or ideal cost of instruction at the present time may not be the standard five or ten years hence. On the one hand, the costs of instruction in the 48 high schools which are considered in this study may be reduced as a result of larger enrolments which permit a better organization of classes. On the other hand, the costs of instruction may be raised because of increases in the salaries of teachers, which may be expected to result from the increasing demand for teachers and the

more rigid requirements for their qualification. Standards should be set up year by year, and the method of deriving the standards should be determined by the conditions which prevail when they are set up.

The use of standards.—The attempt to adjust the costs of instruction in a high school so that they will approach a conformity with an accepted standard has its value, not so much in the results which may come from a raising or a lowering of costs as a whole, as in the results which may come from an equalization of costs. By this means the funds of a high school are distributed among the various subjects in proportion to the results which are expected from each. If ten times as many students are enrolled in English as in Latin or agriculture, for example, then approximately ten times as much money will be expended in paying for instruction in English as is expended in paying for instruction in either of the latter subjects. The reason is that ten times as much instruction is bought in the former subject as in either of the latter.

It may be argued that the use of standards in equalizing the costs of instruction may have pernicious results in that the smaller high schools will be discouraged from introducing new subjects because of the unusually high costs which result from the small demand for them. We have no data which bear upon the relative values of the different subjects of study. Whatever their relative values may be, however, it seems entirely safe to conclude that no subject for which there is not a demand sufficient to bring the cost of instruction down to a level approaching that of the other subjects has any place on a school's program. If the community's needs warrant the introduction of a new subject and the demand for the subject is lacking, then a sufficient demand should be created before the subject is introduced.

The same conclusion applies also to subjects already on a school's program which are costing for instruction prices entirely out of proportion to the demand and far in advance of the prices which are being paid for instruction in the other subjects. An examination of Table I reveals the prevalence of the practice. Schools are there shown to be paying two, three, and four times as much for instruction in modern language, Latin, agriculture, commercial subjects,

household occupations, shopwork, or normal training as for an equal amount of instruction in English, mathematics, science, or history. Varying combinations of inequality are shown. Here again it is unnecessary to enter into a discussion of the values of these subjects. It seems perfectly clear, if the value of one subject in any degree approximates the value of another, that no community has the right to pay an exorbitant price for instruction in the one at the expense of instruction in the other. Either the demand for the high-priced subject should increase, or the equipment of the school should provide for the organization of larger classes, or the subject should be abandoned until it can be reintroduced at a fair price.

CONCLUSIONS

1. The length of the recitation period is a negligible factor in determining the cost of instruction.

2. The actual salary paid to teachers is no reliable index of the price which a community is paying for instruction.

3. The cost per class is a more reliable index of the cost of instruction than is the salary of teachers, although a low cost per class does not necessarily mean that a community is getting instruction at a low rate, and a high cost per class does not necessarily mean that a community is paying a high price for instruction.

4. Of the factors which we have considered, the average size of classes is the most important factor which enters into a determination of the cost of instruction. Small size of classes may be taken invariably to indicate that a community is paying a high price for instruction; conversely, large size of classes indicates that a community is buying instruction at low rates.

5. The total enrolment of the school, when it is less than 90 to 100 is an important factor in determining the average size of classes and the cost of instruction; when the enrolment exceeds 90 to 100 it becomes a relatively unimportant factor.

6. The standard cost of 1,000 student-hours of instruction, set up with the double purpose in view of improving the internal organization and raising the salaries of teachers in the first-class high schools of West Virginia, falls somewhere between $60 and $70.

SCIENTIFIC METHOD IN THE RECONSTRUCTION OF NINTH-GRADE MATHEMATICS

A Complete Report of the Investigation of the Illinois Committee on Standardization of Ninth-Grade Mathematics, 1913–1918. By HAROLD ORDWAY RUGG, Associate Professor of Education, University of Chicago; and JOHN ROSCOE CLARK, Chairman, Department of Mathematics, Parker High School, Chicago. The University of Chicago Press, Chicago, Illinois.

AN EVALUATION BY WILLIAM BISHOP OWEN
Principal, Chicago Normal School

This monograph marks an epoch in the process of educational reorganization and reconstruction in America that began about a decade ago and that promises to result not only in a new and scientific curriculum but also in the establishment of sound methods of securing further progress. This is very great praise, but it is not too great. This review will attempt to justify the judgment expressed by pointing out the factors which contribute to the peculiar value the study has for the present situation in American public-school education.

There are three great influences at work in American education to which must be ascribed the changes already made and those clearly seen in prospect. These influences are (1) the social point of view represented by sociology and social psychology, (2) applied psychology particularly in the field of learning, statistics, and biometric measurements, and (3) the experimental method as a conscious technique of investigation in any field. The theory and practice of our schools has been largely empirical. Our curricula, especially in the high school, represent traditional values. Until recently there has been no adequate point of view, no recognized scientific apparatus to be used in constructing a curriculum and in guiding school practice. The significance of the work of Mr. Rugg and Mr. Clark lies in the way in which the results of these three departments of science have been used to solve a very difficult problem. It is the *combination* of the methods of these sciences in such a way

as to show how they are mutually helpful and reciprocally corrective that constitutes the *contribution* of the authors and that has made their work a pioneer in the field of curriculum-making. The social point of view is maintained throughout in determining the origin, purpose, and value of the content of the mathematical curriculum, the assured results of the psychology of the learning process are applied in the treatment of the development of abilities through drill, and the experimental and statistical methods are utilized in solving the problems of distribution of emphasis, elimination of worthless material, and testing results. The authors have thus brought the social point of view into a practical work-a-day union with the science of psychology thus forging a tangible apparatus and procedure of curriculum determination. It is this simultaneous utilization of the three great foundations on which a scientific education can be built, as has been said before, that constitutes the distinction and value of the monograph.

There are ten chapters in the book which contains also an appendix and an index. Chapter i raises the problem. Ninth-grade mathematics is on trial. The public condemns it, the percentage of failures is an indictment of it, and standardized tests show that it is inefficient. The remaining chapters are given over to the report of investigations carried on by the authors to find out where the trouble lies—in the pupil, the teaching, the course of study, or in what.

Chapter ii contains a detailed inventory of the ninth-grade course in mathematics. The investigations of Koos are used to show that there is a great uniformity throughout the country in the location of beginning algebra in the ninth grade, in the length of time it is studied, and in the methods of the classroom. "Textbooks dominate the content and organization of courses in mathematics," is the key to the situation. And these textbooks have been written by college men, not by the school men who teach the class, and therefore are alone intimately in contact with the problem. A further analysis shows that the actual course determined by the textbook is chiefly devoted to formal as contrasted with "thought" problems. The authors enunciate, in the way of contrast, their mathematical creed—surely a sound one: "We teach mathematical

subjects in the public schools to *develop in the pupil the ability to use intelligently the most powerful devices of quantitative thinking: the equation, the formula, the graph, and the properties of the more important space forms.*

Chapter iii tells us how algebra became the ninth-grade course. It is an interesting if brief outline of the history of the transfer of algebra from the later years of the American college course to the first year of the high-school course. Along with this change of the position of algebra in the course there went a development in method and content. Yet this change was not in the direction of simplification, as one might suppose, but rather one of enlargement and increased formality. It is high time, therefore, that the content of this first-year high-school course be scrutinized and consciously reorganized from an educational standpoint.

Chapters iv and v proceed to attack the problem of reorganization of ninth-grade algebra. The authors set forth their fivefold program. This program comprises five steps: the determination of general aim and outcomes, the clear-cut classification of subject-matter, the design and conduct of tests, the critical evaluation of the results of the tests, experimental teaching. These chapters are largely devoted to the discussion of the use of standardized tests. The authors find three functions for these tests: (1) classifying or grading children, (2) diagnosis revealing weaknesses, (3) supervising and marking. Each of these functions is clearly and adequately discussed. These chapters form an excellent brief treatment of the types and fundamental scientific bases of standard tests.

Chapter vi is a summarized report of the results of the investigation begun in 1913 by a committee of the Mathematics Section of the University of Illinois High-School Conference. The general progress of the investigation is outlined and the results clearly summarized. The chapter is indispensable for every serious student of the problems of high-school teaching.

Chapter vii is devoted to training in logical thinking. It contains an analysis of the thought process, discusses the meaning of "attitude," reviews the whole question of "transfer," and points out the opportunities afforded by the study of algebra for developing those attitudes, skills, habits, and concepts which can be used

in the solution of new problems. The "problem-project-method" is *implicitly* recognized as fundamental to the educational use of mathematics. The chapter is clear, well written, is in accord with the work of Dewey, Thorndike, and others, and might well serve as an introduction to the discussion of the educational value of the study of mathematics while serving to outline its subordinate aims and outcomes.

Chapter viii deals more specifically with curriculum-making in secondary mathematics. It lays down two criteria for determining the content of the course—the social criterion and the psychological criterion. The former has been used in many of the attempts at remaking the course of study, the latter has received little satisfactory study. A review is made of the well-known recent attempts to reorganize the subject-matter of the high-school course in mathematics. This review is a good piece of criticism. The observation that "ninth-grade mathematics will certainly come to be regarded by school men in our generation as the last year of mathematics that will be required" is true and significant. "Hence the importance of including in this last year the most important mathematical notions and devices." The authors proceeded to ascertain what are most important by finding what of the current first-year algebra is used (1) in further high-school subjects such as physics, chemistry, and the like, and (2) in the industrial occupations. The results are presented with definiteness and at length and will serve as an invaluable reference. The conclusion reached is set forth in the following paragraph:

> To build such a course clearly demands the elimination of one-third to one-half of the present ninth-grade course. Note the economy of time through elimination of nonessentials. We shall save at least four weeks on special products and factoring, two to four weeks on the formal manipulation of addition, subtraction, multiplication, and division, a week on highest common factor and least common multiple, at least one week (probably two) on fractions, between one and two weeks on quadratic equations, between one and two weeks on radicals.

Chapter ix is a report of experiments conducted by the authors to determine how pupils can best learn algebra. The results cannot easily be reproduced in this review but should be studied for their

significance and promise. They are sufficiently interesting to lead one to await with interest the fuller report of the completed experiment. The experiment itself may easily prove to be the most valuable contribution made by the authors.

Chapter x is a résumé of the preceding chapters and their conclusions with an appeal for co-operation in the working out of an educational course in mathematics for the ninth grade.

It is almost ungracious to suggest that the style of the monograph is not always as simple and compact as one could wish. There is a great deal of unnecessary repetition. But these are minor and perhaps negligible defects. The authors have done the American schools a real and lasting service. They have shown how to go to work to reorganize the curriculum of these schools. In these days of overcrowding, of competing claims, of subjective opinion, of persistent demand for reorganization, theirs is indeed a piece of genuine pioneer work.

EDUCATIONAL NEWS AND EDITORIAL COMMENT

A New School of Education

The several special departments which Boston University has been conducting in its efforts to improve the quality of public-school teaching in New England are to be consolidated to form a separate school of education. This new school will have its headquarters at the College of Business Administration. Its chief appeal will be to graduates of two-year normal schools who will wish to round out their course and to students in colleges who are planning to make teaching a life-profession. The degree to be given upon satisfactory completion of the course is Bachelor of education.

Vocational Re-education

The American Association for Labor Legislation would enlarge the scope of the Hoke Smith bill, which provides vocational rehabilitation for disabled soldiers and sailors, by an amendment extending the plan also to maimed victims of industrial accidents.

It is felt that the Federal Board of Vocational Education will complete its work for the soldiers and sailors within a few years after the close of the war. The American Labor Association would make use of the machinery thus started for re-education of more than 100,000 industrial cripples who would thus be restored to skilled trades. The government equipment for this work should be used to its fullest capacity, so that a steady stream of re-created workers, the maimed from war and industry, may be turned back immediately to skilled employment.

An International Educational Alliance

Mayor John F. Hylan of New York and President Mano G. Menocal of Cuba are the prime movers in the establishment of an international educational alliance between the United States and the nations of South and Central America. The main object is closer union between these nations.

Under the plan proposed Spanish would be taught in the schools of New York and ultimately throughout the nation, while English would be taught in the schools of Cuba and Central and South America. Students of universities in the United States will also interchange with those in Latin-American schools, so that the Spanish language and customs may be learned by our young men and English customs by the Latins. This movement is backed by other important educators, including President Faunce, of Brown University. He wrote Dr. Gabriel Casuso de Roque, of the University of Havana, and received the following reply:

Havana University will gladly join a pan-American educational alliance which will work for a closer union of all the American Republics. We should welcome graduates to specialize in the Spanish language and Spanish literature and history. In Havana these young men could prepare for business or diplomatic work in South American countries.

Teaching German

The *North American Review* strikes the keynote of sensible moderation concerning German in our schools. Says that journal: "It would be foolish to exclude German from the curriculum simply because we are at war with Germany. But in so far as German is retained, it should be regarded, treated, and taught as a foreign language, on a par with other foreign languages."

Under a program like this the *School Review* would regard as sensible state or federal action which would make it unlawful to conduct elementary schools in German or in any other language but English. It is notorious that in many schools with large German constituencies that tongue has been exploited far beyond due bounds, as though English were the foreign and German the native language. German textbooks are not wanting which assert that it is dishonorable for American Germans not to establish their native tongue in America.

That this division of tongues has been and is being deliberately used to develop and promote a pernicious dual alliance there can be no doubt. *Current Opinion*, speaking of what Professor Voss of Wisconsin calls "the beautiful and profitable task of American Germans," viz., "to prepare the way in this country for the German spirit and the German conception of life," shows to what extent that extremely undesirable end is being accomplished:

According to ex-Senator Lafayette Young, of Iowa, thousands of schools in the Northwest close their daily sessions with the singing of "Deutschland

ueber Alles." According to the president of the American Defense Society, there are one hundred German papers printed in this country, most of them "insidiously disloyal." Professor Earl Sperry, of Syracuse University, who has been conducting a governmental investigation, finds 491 German schools and many church societies used for "instilling ideas of Germanism." In Nebraska alone, according to the *New York Sun*, there are more than 200 Lutheran parochial schools in which there is very little English taught and in many of which German is taught exclusively. It is reported that out of seventy-six men who presented themselves recently to the draft board from a remote district in Wisconsin sixty spoke the German language only, or a very few words of English, and Senator Thomas, of Colorado, says he has received information that 700,000 men of draft age in the country are unable to read or speak English. According to Secretary Lane, we have in our population five and one-half million persons who cannot speak or read English, one and one-half million of them being native-born. According to another investigator, Dr. Wheaton, Fort Wayne, Indiana, spent last year $14,672 for teaching German immigrants and $108 for teaching English; Columbus, Ohio, spent nothing for teaching English and $16,000 for teaching German; Philadelphia spent $11,000 for English instruction and $70,000 for German. According to Professor Sperry's testimony before a Senate committee, the German Reichstag in 1912 appropriated one million marks for furthering the teaching of German in schools in foreign countries, and articles were read by him from German papers predicting that in 100 years the United States would be completely controlled by Germany.

No individual and no community which is undeniably American in its sympathies and purpose could object to conducting elementary schools in English. The intense eagerness with which many of our immigrant communities seek to master English is in striking contrast to the tenacity with which German communities refuse to do so. No use mincing words; they should be compelled to do so.

But the program of the *North American Review*, with equal wisdom urging that German be taught as a foreign language, would preclude many of the ill-considered and even unjustifiable actions which are prevalent the country over. For example, the most extreme action has recently occurred in Montana. On April 22 the State Council of Defense ordered that

> the use of the German language in public and private schools cease in the state . . . . and in the pulpit. . . . . German books and histories must be thrown out of the public and private libraries . . . . a special prosecutor was appointed to see that these orders are obeyed . . . . a long list of books, German or in other tongues, that are under the ban, will be issued, and their destruction

enforced. Librarians, school officials, ministers, etc., who disobey the order are warned that punishment will be severe [*Daily Missoulian*, April 23].

News of this order was received in the state university on the morning of the twenty-third, and at noon all classes in German were discontinued. What is to be done with students majoring in German and with instructors is still an open problem. Fear is expressed that even the German library in the university may be destroyed. Fear is expressed that any person in the university with a German book in his possession becomes *ipso facto* a lawbreaker. One of the instructors in the university goes on to say

> that the attempt to wipe German out of the state in this unreasonable and unreasoning manner will cripple the entire research work of the departments of chemistry, physics, mathematics, botany, biology, zoölogy, etc., and will practically close the school of music for want of technical material; that the departments of language and literature will necessarily have to suffer; that, finally, students in this state are to be given no opportunity to study German—a language which leading officers at the front tell us is invaluable for war purposes; that, in short, we are to be cut off in an autocratic mannèr from any contact with the great German thinkers, philosophers, and scientists—this is as nothing compared with the Montana way of making the world safe for democracy. It seems to me that this unwarrantable intrusion into the rights of the schools in the fields of research and teaching deserves strong condemnation at the hands of the leading editorial journals.

Should the action of the State Council result in the extremes thus predicted the *School Review* would agree that it indicates "a grave state of public hysteria." However, the program as set forth in the *Daily Missoulian* speaks of a list of prescribed books. It is inconceivable that mere scientific and literary books should be included. Unquestionably the order prohibiting German as a foreign language in higher institutions is hysterical. It may be, however, difficult to discriminate, and for the period of the war, even if some schools and some teachers suffer, the less German, both press and instruction, the better.

EDUCATIONAL WRITINGS

I. THE PROFESSIONAL READING OF THE HIGH-SCHOOL PRINCIPAL

FRANKLIN W. JOHNSON
The University of Chicago High School

In the autumn of 1916 the author prepared a list of books for the professional reading of high-school principals which was presented at the University of Illinois Secondary School Conference and was later published in the April, 1917, number of the *School Review*. A number of men whose work lies in the field of secondary education in universities in various parts of the country were asked to submit lists of ten or fifteen books which they regarded as most valuable for the professional reading of high-school principals. Eight men from as many universities submitted such lists. The books named were classified under ten heads. The titles under each head were arranged in order of the number of choices assigned to each, the number of choices being indicated in each case. The publisher's name, date of publication, number of pages, and net price were given for each book. A brief bibliographical note was also added to each title for the purpose of suggesting the content or distinctive method of treatment of the book.

While this published list seems to have proved to be of considerable value to principals who have felt the need of guidance in the selection of books for their reading, the author has felt that the list would carry more weight if a larger number of persons had contributed their opinions, and if, in addition to the University teachers of education, school principals and superintendents in actual service had been asked to contribute to its preparation. For the purpose of securing a wider expression of opinion and also of bringing the list up to date, the original list, as published, has been submitted to the eight men whose opinions it represented and to a considerable additional number of men similarly engaged in university departments of education as well as to a large group of persons actually engaged in the administration of high schools. A letter was sent to each person who was asked to co-operate, inclosing a copy of the original list and giving in addition the titles of several books published since the preparation of the earlier list. Each person was asked to submit a list of fifteen books or journals which he would recommend as most important for the professional reading of the progressive high-school principal. In making his selection he was asked to add any title that seemed worthy of a place, even though it was not included among those suggested.

Lists were returned from thirty men, of whom fifteen were from departments of education in as many colleges or universities and fifteen were from men engaged in the administration of secondary education, chiefly principals of high schools. Each of these groups represents a very wide geographical distribution. As in the earlier bibliography, individual lists show what may be called institutional preferences. With the wide geographical area from which the reports have come, however, these preferences have been pretty well distributed and have resulted only in extending the total number of titles in the completed list.

The list has been classified as before, and the number of persons naming each title has again been placed before the title. The same significant facts observed in the earlier list are shown here. The large number of titles indicates the difficulty of selecting from the available material what is of most value. In the earlier list there were sixty-two different titles, including in all ninety-one books and journals. In the present list there are seventy-five different titles, including in all one hundred and four books and journals. Twenty new titles are added, while only eight titles which appeared in the earlier list have been omitted. Of the new books three stand out pre-eminently in their respective groups: Inglis' *Principles of Secondary Education* (21), which receives the largest number of choices in the administrative group; Colvin's *An Introduction to High School Teaching* (20), which receives only two less choices than Parker's *Methods of Teaching in High Schools* (22), which still retains first place by this narrow margin in the methods group; and Rugg's *Statistical Methods Applied to Education* (8), which receives more choices than any other two titles in the group on measurements and researches. In some of the other groups there is pretty general agreement on the most important books: Dewey's *Democracy and Education* (15), Judd's *Psychology of High School Subjects* (18), Davis' *Vocational and Moral Guidance* (12), and the *School Review* (20).

The progressive high-school principal must devote an increasing amount of time to reading the rapidly expanding literature of secondary education. The large number of titles in this list indicates that he can read only a part, perhaps a small part, of the material which has real value. This bibliography, representing the combined judgment of many competent persons, should enable him to select his material with a minimum of effort and loss.

I. PRINCIPLES OF EDUCATION

(15) Dewey, John. *Democracy and Education.* Macmillan, 1916. Pp. 434. $1.40.
An introduction to the philosophy of education. The author "endeavors to detect and state the ideas implied in a democratic society, and to apply these ideas to the problems of the enterprise of education."

(4) Moore, E. C. *What Is Education.* Ginn, 1915. Pp. 357. $1.25.
A discussion of some of the fundamental presuppositions of education.

(3) Bagley, W. C. *Educational Values.* Macmillan, 1911. Pp. 267. $1.10.
The controls of conduct; the classification of functions and values.

(2) Bolton, F. E. *Principles of Education.* Scribner, 1910. Pp. 790. $3.00.
The author "assembles the main, well-tested results of the scientific study of education from the psychological and biological viewpoints and presents them in a way which secures continuity, correlation, and a unified interpretation of them."

(1) Smith, W. R. *An Introduction to Educational Sociology.* Houghton Mifflin, 1917. Pp. 412. $1.75.
Education discussed from the social and sociological, as distinguished from the individual and psychological, points of view.

(1) Thorndike, E. L. *Education.* Macmillan, 1912. Pp. 292. $1.25.
A brief account of the aims, means, methods, and results of education.

2. PSYCHOLOGY

(18) Judd, C. H. *Psychology of High School Subjects.* Ginn, 1915. Pp. 515. $1.50.
A practical application of psychology to the materials and methods of high-school instruction.

(9) Colvin, S. S. *The Learning Process.* Macmillan, 1911. Pp. 336. $1.25.
The psychology of learning as related to the theory and practice of elementary and secondary education.

(4) Hall, G. S. *Adolescence.* Appleton, 1904. Vol. I, pp. 589; Vol. II, pp. 784. $7.50.
The psychology of adolescence and its relations to physiology, anthropology, sociology, sex, crime, religion, and education.

(4) Thorndike, E. L. *Psychology of Learning.* Teachers College, 1913. Pp. 452. $2.50.
An experimental study of the learning process.

(1) Angell, J. R. *Psychology.* Holt, 1905. Pp. 402. $1.50.
An introductory study of the structure and function of human consciousness.

(1) Dewey, John. *Interest and Effort in Education.* Houghton Mifflin, 1913. Riverside Educational Monographs. Pp. 102. $0.60.
Discusses types of interest and their place in the theory of education.

(1) Hollingsworth, H. L. *Vocational Psychology.* Appleton, 1917. Pp. 308. $2.50.
Deals with the problems and methods of the psychology of individual differences.

(1) Thorndike, E. L. *Educational Psychology.* Teachers College, 1913–14. Vol. I, pp. 327; Vol. II, pp. 452; Vol. III, pp. 406. $2.50 per volume.
The volumes treat the following subjects: the original nature of man; the psychology of learning, mental work and fatigue, and individual differences and their causes.

3. ADMINISTRATION

(21) Inglis, Alexander. *Principles of Secondary Education.* Houghton Mifflin, 1918. Pp. 742. $2.75.
An analysis of the factors and principles involved in a constructive theory of secondary education. Part I deals with the pupils, Part II, with the institution and its purpose, Part III, with the means and material of secondary education.

(20) Johnston, C. H. *The Modern High School* (rev. ed.). Scribner, 1916. Pp. 847. $1.75.
The administration and extension of the high school with examples and interpretation of significant movements. Contains extensive bibliography.

(13) Monroe, Paul (editor). *Principles of Secondary Education.* Macmillan, 1914. Pp. 790. $1.90.

Contains twenty-one chapters by the editor and other specialists on the history, organization, and materials of secondary education.

(12) Snedden, David. *Problems of Secondary Education.* Houghton Mifflin, 1917. Pp. 333. $1.50.

A critical analysis of the aims of secondary education.

(11) Cubberley, E. P. *Public School Administration.* Houghton Mifflin, 1916. Pp. 479. $1.75.

A statement of the fundamental principles underlying the organization and administration of public education.

(6) Hollister, H. A. *High School and Class Management.* Heath, 1915. Pp. 314. $1.25.

Administration and technique of teaching in the high school.

(6) Johnston, C. H. *High School Education.* Scribner, 1912. Pp. 555. $1.50.

Contains chapters by the author and several others on the history, organization, and materials of instruction of the high school.

(5) King, Irving. *The High School Age.* Bobbs-Merrill, 1914. Pp. 233. $1.00.

Discusses the physical, mental, and social characteristics of adolescence in their relation to the organization and activities of the school.

(3) Russell, W. F. *Economy in Secondary Education.* Houghton Mifflin, 1916. Riverside Educational Monographs. Pp. 74. $0.35.

Causes of waste discussed, and comparison with foreign schools.

(2) Morehouse, F. M. *The Discipline of the School.* Heath, 1914. Pp. 342. $1.25.

Deals with the theoretical and practical aspects of school discipline.

(2) Strayer, G. D., and Thorndike, E. L. *Educational Administration.* Macmillan, 1913. Pp. 391. $2.00.

An application of scientific method to the studies of students, to the teaching staff, organization of schools, and school products.

(1) Davis, C. O. *High School Courses of Study.* World Book Co., 1913. Pp. 172. $1.50.

A constructive study applied to New York City.

(1) De Garmo, Charles. *Principles of Secondary Education—The Studies.* Macmillan, 1907. Pp. 299. $1.25.

The function and value of the studies and their organization into curricula.

(1) Rugg, H. O., and Clark, J. R. *Scientific Method in the Reconstruction of Ninth-Grade Mathematics.* University of Chicago Press, 1918. Pp. 189. $1.00.

Report of the investigation of the Illinois Committee on Standardization of Ninth-Grade Mathematics.

(1) Sachs, Julius. *The American Secondary School.* Macmillan, 1912. Pp. 295. $1.10.

A discussion of the aims and methods of public and private secondary schools with frequent reference to the practices of foreign countries.

4. HISTORICAL AND COMPARATIVE

(11) Brown, E. E. *The Making of Our Middle Schools.* Longmans, 1902. Pp. 547. $3.00.

An authoritative and exhaustive treatment of the history of secondary education in America.

(9) Farrington, F. E. *French Secondary Schools.* Longmans, 1910. Pp. 450. $2.50.

An account of the origin, development, and present organization of secondary education in France.

(6) Russell, J. E. *German Higher Schools.* Longmans, 1910. Pp. 455. $2.50.

The history, organization, and methods of secondary education in Germany.

(1) Brereton, C. *Studies in Foreign Education.* Houghton Mifflin, 1913. Pp. 302. $1.60.

A comparative study of French, English, and German schools.

(1) Foght, H. W. *Rural Denmark and Its Schools.* Macmillan, 1915. Pp. 355. $1.40.

An account of the work of the rural schools of Denmark with special reference to agricultural training.

(1) Learned, W. S. *The Oberlehrer.* Harvard University Press, 1914. Pp. 150. $1.25.

A study of the social and professional evolution of the German schoolmaster with application to conditions in American schools.

5. METHODS OF TEACHING

(22) Parker, S. C. *Methods of Teaching in High Schools.* Ginn, 1915. Pp. 529. $1.50.

A practical treatment of methods in which the author takes the point of view that efficiency and economy in instruction are facilitated by (1) adapting all instruction to contemporary social needs, (2) basing methods of instruction on sound psychological principles, and (3) applying principles of scientific business management to the conduct of teaching.

(20) Colvin, S. C. *An Introduction to High School Teaching.* Macmillan, 1917. Pp. 451. $1.60.

General methods of instruction in the high school. Designed to give practical help to students preparing to enter upon the work of teaching.

(11) Hall-Quest, A. L. *Supervised Study.* Macmillan, 1916. Pp. 433. $1.25.

A discussion of the study lesson in the high school.

(7) Bagley, W. C. *The Educative Process.* Macmillan, 1905. Pp. 358. $1.25.

Covers the field commonly included under the term "general method," but deals with principles rather than with the details of device and method.

(7) Dewey, John. *How We Think.* Heath, 1910. Pp. 224. $1.00.

The nature of reflective thought, and means and methods of training in thinking.

(6) Whipple, G. M. *How to Study Effectively.* Public School Publishing Co. Pp. 44. $0.50.

A clear discussion of the principles of effective study with practical suggestions for forming right habits.

(3) Sandwick, R. L. *How to Study.* Heath, 1915. Pp. 170. $0.60.

Discusses the principles of effective study.

(3) Stevens, Romiett. *The Question as a Measure of Efficiency.* Teachers College, Contributions to Education, No. 48. Teachers College, 1912. Pp. 95. $1.00.

A critical study of the efficiency of classroom instruction as measured by the number and quality of questions.

(1) Brown, R. W. *How the French Boy Learns to Write.* Harvard University Press, 1915. Pp. 260. $1.25.

A study in the teaching of the mother-tongue.

(1) Strayer, G. D., and Norsworthy, Naomi. *How to Teach.* Macmillan, 1917. Pp. 297. $1.40.

A discussion of the principles of psychology involved in teaching and their application in the work of the classroom.

(1) Thorndike, E. L. *The Principles of Teaching.* Seiler, 1916. Pp. 293. $1.25.

A manual to guide in the application of principles based on psychology.

6. MEASUREMENTS AND RESEARCHES

(8) Rugg, H. O. *Statistical Methods Applied to Education.* Houghton Mifflin, 1917. Pp. 410. $2.00.

A textbook in the quantitative study of school problems for students of education.

(3) Monroe, DeVoss, and Kelly. *Educational Tests and Measurements.* Houghton Mifflin, 1917. Pp. 309. $1.50.

A summary and comparison of the available tests for the various school subjects.

(3) Starch, D. *Educational Measurements.* Macmillan, 1916. Pp. 202. $1.25.

The measurement of abilities in various subjects of the elementary- and high-school curricula.

(3) Whipple, G. M. *Manual of Mental and Physical Tests.* Warwick & York, 1915. 2 vols., pp. 365 and 336. $3.75 per set.

The purpose and methods of conducting tests with the results and conclusions of many tests.

(2) Van Denberg, J. K. *Causes of the Elimination of Students in Public Secondary Schools of New York City.* Teachers College, Contributions to Education, No. 47. Pp. 206. $1.50.

(1) Terman, L. M. *The Measurement of Intelligence.* Houghton Mifflin, 1916. Pp. 362. $1.50.

An explanation of, and a guide for, the use of the Stanford revision and extension of the Binet-Simon Intelligence Scale.

7. SURVEYS

(7) *Portland, Oregon, Survey.* E. P. Cubberley and Others. World Book Co., 1915. Pp. 441. $1.50.

A textbook on city-school administration based on a concrete study.

(4) Cleveland Survey, Russell Sage Foundation, 1916, 25 vols.

The most complete survey yet made, consisting of 16 volumes directly relating to the schools, and 9 volumes on the vocations of the city of Cleveland.

Schools:

Child Accounting in the Public Schools. L. P. Ayres. $0.25.
Educational Extension. C. A. Perry. $0.25.
Education through Recreation. G. E. John. $0.25.
Financing the Public Schools. E. Clark. $0.25.
Health Work in the Public Schools. L. P. Ayres and Mary Ayres. $0.25.
Household Arts and School Lunches. Alice C. Boughton. $0.25.

Measuring the Work of the Public Schools. C. H. Judd. $0.50.
Overcrowded Schools and the Platoon Plan. S. O. Hartwell. $0.25.
School Buildings and Equipment. L. P. Ayres and Mary Ayres. $0.25.
Schools and Classes for Exceptional Children. David Mitchell. $0.25.
School Organization and Administration. L. P. Ayres. $0.25.
The Public Library and the Public Schools. L. P. Ayres and Adele McKinnie. $0.25.
The School and the Immigrant. H. A. Miller. $0.25.
The Teaching Staff. W. A. Jessup. $0.25.
What the Schools Teach and Might Teach. Franklin Bobbitt. $0.25.
The Cleveland School Survey (summary volume). L. P. Ayres. $0.50.

Vocations:

Boys and Girls in Commercial Work. Bertha M. Stevens. $0.25.
Department Store Occupations. Iris P. O'Leary. $0.25.
Dressmaking and Millinery. Edna C. Bryner. $0.25.
Railroad and Street Transportation. R. G. Fleming. $0.25.
The Building Trades. F. L. Shaw. $0.25.
The Garment Trades. Edna C. Bryner. $0.25.
The Metal Trades. R. R. Lutz. $0.25.
The Printing Trades. F. L. Shaw. $0.25.
Wage Earning and Education (summary volume). R. R. Lutz. $0.50.

(1) *The Public School System of San Francisco, California.* A report to the San Francisco Board of Education of a survey made under the direction of the United States Commissioner of Education. Bureau of Education Bulletin, 1917, No. 46. $0.60.

(1) *Educational Section of the Springfield, Illinois, Survey.* L. P. Ayres and Others. Russell Sage Foundation, 1914. Pp. 152. $0.25.

* These volumes received each the specific choice of one person.

8. INDUSTRIAL EDUCATION AND VOCATIONAL GUIDANCE

(12) Davis, J. B. *Vocational and Moral Guidance.* Ginn, 1914. Pp. 303. $1.25.
Emphasizes methods of vocational and moral guidance through oral and written expression in English.

(4) Thompson, F. V. *Commercial Education in Public Secondary Schools.* World Book Co., 1915. Pp. 194. $1.50.
A critical and constructive treatment of current problems in commercial education in the secondary school.

(3) Davenport, Eugene. *Education for Efficiency.* Heath, 1909. Pp. 184. $1.00.
Industrial education in the elementary and high schools with particular reference to agriculture.

(1) Brewer, J. M. *The Vocational Guidance Movement.* Macmillan, 1918. Pp. 333. $1.25.
The problems and possibilities of vocational guidance with an extensive bibliography.

(1) Carleton, F. T. *Education and Industrial Evolution.* Macmillan, 1908. Pp. 320. $1.25.
A discussion of the educational problems connected with social and industrial betterment.

(1) Leake, A. H. *The Vocational Education of Girls and Women.* Macmillan, 1917. Pp. 430. $1.60.

(1) Puffer, J. A. *Vocational Guidance.* Rand McNally, 1913. Pp. 294. $1.25.
The equipment and methods of the counselor; various occupations and professions.

9. GENERAL

(7) Lewis, William C. *Democracy's High School.* Houghton Mifflin, 1914. Riverside Educational Monographs. Pp. 130. $0.60.
A popular discussion of the school with emphasis upon the pupil rather than upon the traditional subjects of instruction.

(3) Snedden, D. S. *Problems of Educational Readjustment.* Houghton Mifflin, 1913. Pp. 262. $1.50.

(2) Butler, N. M. *The Meaning of Education.* Scribner, 1915. Pp. 378. $1.50.
Seven essays and addresses dealing chiefly with the function and organization of the school.

(1) Monroe, Paul (editor). *Cyclopedia of Education.* 5 vols. Macmillan, 1911. $5.00 each.
A concise discussion of all topics of importance and interest to the teacher with cross-references and bibliographies.

(1) Weyl, W. E. *The New Democracy.* Macmillan, 1913. Pp. 370. $2.00.
An essay on certain political and economic tendencies in the United States.

10. PERIODICALS AND PROCEEDINGS

(20) *School Review.* University of Chicago Press. $1.50. Published monthly except July and August. Managing editor, R. L. Lyman.
A journal of secondary education.

(11) *Educational Administration and Supervision.* Warwick and York, Hershey, Pa., and Baltimore, Md. $2.50. Published monthly except July and August. Editors: W. C. Bagley, W. W. Charters, L. D. Coffman, Alexander Inglis, David Snedden, and G. D. Strayer.

(4) *School and Society.* The Science Press, Lancaster, Pa. $3.00. Published weekly. Editor, J. McKeen Cattell.

(3) *Educational Review.* Educational Review Publishing Co., Easton, Pa., and New York. $3.00. Published monthly except July and August. Editor, Nicholas M. Butler.
A journal dealing with the general field of education.

(2) *Proceedings of the North Central Association of Colleges and Secondary Schools.* Published by the Association, Henry E. Brown, Secretary, Kenilworth, Illinois. 1917.

(1) *American School Board Journal.* Bruce Publishing Co., Milwaukee, Wis. $2.00. Published monthly. Editor, W. C. Bruce.

(1) *Teachers College Record.* Teachers College, New York. $1.50. Published bimonthly except July. Editor, James E. Russell.

II. REVIEW OF CURRENT LITERATURE RELATING TO GENERAL SCIENCE

CHARLES J. PIEPER
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The literature relating to general science for the year 1917 differs from that of previous years in that less emphasis is given to the question of the desirability and value of the course and more discussion is given to the questions of how to organize, administer, and teach the course.

An extensive bibliography of articles in current educational magazines relating to the general science situation is being prepared annually for the March number of the *General Science Quarterly* by W. L. Eikenberry. It will be unnecessary therefore to include a bibliography of this literature in the present review.

A. BOOKS ON TEACHING OF SCIENCE

While no book on the teaching of general science has been published there have appeared three publications which relate closely to the subject and which are of interest to those who teach or supervise general science courses.

Twiss, G. W. *Science Teaching.* New York: Macmillan, 1917. Pp. 479.

After long experience as a teacher of science, a high-school inspector, and a professor of educational principles and practice, the author has prepared this text for prospective teachers of the natural sciences. The first eleven and the last chapters discuss the principles which apply to the teaching of all science courses. Chapters xii–xxiii treat the particular sciences, including biology, geography, physics, chemistry, and general science. Each of the special sciences excepting general science is considered from the viewpoints of principles, methods, and equipment. While the chapter on general science is rather brief and somewhat disappointing, the first part of the book contains valuable material for the general science teacher under the chapter titles: "Meaning of Science," "The Viewpoint of the Science Teacher," "The Genesis of Science," "Methods of Teaching," "Educational Functions and Value of the Sciences," "The Disciplinary and Cultural Values of Science," "Classroom and Laboratory Instruction," "Lectures, Excursions, and Reviews," "Equipment for Science Teaching," and "The Sciences and the Curriculum." Each of these topics is treated in a practical manner. The author has not made the mistake of excessive theorizing on the values of science instruction. It is hardly possible to state in a few words the underlying principle of the book, yet one can gain what the reviewer believes to be the message of the book, as far as concerns method and aims, by quoting one of the four fundamental principles stated on page 21: "The scientific method is essentially a method of solving problems that present either a utilitarian or an intellectual appeal;

therefore the true way to induct beginners into its use is to confront them with such problems, and guide them in using the scientific method in reaching their solutions."

Teachers' Manual—Upper Grades of Elementary School and First Year of High School, Bulletin No. 2, 1917. Board of Education, Commonwealth of Massachusetts. Pp. 50.

This manual is a revised form of the articles which have recently appeared in the *General Science Quarterly*. It has been prepared to stimulate an interest in the present movement toward better science teaching. Among the topics treated are: "Social Aspects of General Science," "Aims, Scope, Psychological Factors Affecting Method," "Material and Organization," "Sources of Material," "Selection of Units and Projects," and "Equipment." An excellent bibliography of reference-reading books is included. Several general units are outlined at some length. These include heat, water supply, and our food supply. Several additional units are briefly stated and offer valuable suggestions to those who wish to teach general science from the environmental viewpoint.

MAYMAN, J. EDWARD. *Teaching Elementary Science in Elementary Schools*. Publication No. 13. Department of Education, New York City, Division of Reference and Research.

General science literature has presented few results of experimental teaching. Although published in 1915, attention is called to this publication as an attempt to discover by experimentation the relative values of the different methods of science instruction. While the experimental work of the author was carried on in the elementary-school science classes, his method is applicable to general science. By extensive testing in fourteen classes the following methods of teaching science are compared: (*a*) the book method, (*b*) the lecture method, (*c*) the experiment method, (*d*) the experiment-notebook method. A few interesting conclusions are listed below.

a) Carefully written notebook work and neatly drawn diagrams of science apparatus do not increase the pupils' knowledge of elementary science.

b) As regards elementary science, elementary-school pupils cannot get the thought from the printed page. Simple diagrams are of no material aid.

c) Poor experimental demonstration is detrimental to efficient teaching.

d) The book method might be used with fairly good results provided the class is exceptionally bright.

B. TEXTBOOKS OF GENERAL SCIENCE

Four textbooks, which have been published since the last review, are mentioned.

FALL, DELOS. *Science for Beginners*. New York: World Book Co., 1917. Pp. 382.

According to the author this text is not a course of information. Its chief purpose is to introduce the pupil to the scientific method by which he

may gain information for himself. It is difficult to state any organizing principle for the text other than that it attempts to present the simple physics and chemistry of everyday experiences. Little space is allowed the biological sciences and geography. Simple exercises are included in the text. Throughout the direct address is used to encourage the pupil to feel that this is his book. The first two chapters on "Science and the Scientific Method" and "What the Young Scientist Must Learn to Do" present a unique introduction to the subject-matter. One naturally raises the question, however, whether or not a real problem in science might not be a more impressive incentive to the scientific method of study than a discussion of what constitutes the scientific method in such quasi-scientific problems as are used. The text would appeal to elementary-school pupils, but the reviewer doubts if it would prove successful in his first-year high-school classes.

CLUTE, W. N. *Experimental General Science.* P. Blakiston's Son & Co., 1917. Pp. 294.

One who expects to find in this publication a large number of simple experiments to be used as a basis for science study must be disappointed on examining it. There are at the ends of the chapters lists of questions which include some practical exercises. The text or descriptive material which precedes the questions abounds in mature generalizations which defeat one of the major purposes of general science-teaching. Thirty of the forty-two chapters relate to physics and chemistry. Nearly all of the remaining chapters, which discuss living things, treat of human physiology and hygiene.

LAKE, CHARLES H. *General Science.* Silver, Burdett & Co., 1917. Pp. 436.

The twenty-four chapters of this text are very comprehensive in their treatment of the elementary facts, principles, and applications of the science of our daily lives. An attempt is made to relate each chapter to the preceding one. Exercises are included in the text, but a large amount of individual experimentation is not encouraged. For those teachers who believe in the textbook method of approach this text will fill a need. The text is somewhat formal in organization and perhaps too difficult for eighth-grade pupils. The various articles of the text contain many abstract statements which present difficulties for mastery without experimentation. The pupil is not led to see and solve problems but is given the finished product. The mechanical features of the book are of the best and the questions at the end of the chapters are well chosen.

COULTER, J. G. *Elementary Science.* New York: Scribner, 1917. Pp. 284.

"To develop some appreciation of nature as a great synthesis and our relation to it" is the principal motive of the text. The foreword—there is no preface—does not state the length of the course for which the book is intended. If it is meant to be a year course, it comes as a surprise to those who know the author's views on a two-year course. The text is written in an interesting

colloquial style, since, according to the foreword, this method of presentation has proved most effective with classes. The subject-matter is quite extensive for the size of the book and is divided into thirty-six chapters. The different sciences are well correlated. Water and related topics, such as water-power, soil formation, soil transportation, solutions, and mechanics of water, are treated first. This is a new departure and a good one. Ten of the thirty-six chapters treat of the biological sciences, geographical material receives considerable space, and approximately fifteen chapters discuss physical science subject-matter. The text is written for the pupil and will be read by him with interest. It will also be a help to the inexperienced teacher in motivating the work.

An Elementary General Science. Daniel R. Hodgdon. Hinds, Hayden, and Eldredge, Chicago.

The reviewer has not had an opportunity to examine this book. According to the announcement it has been prepared for the seventh and eighth grades, the first years of the high school, or the junior high school. The material is organized around the central theme, "The Home." Experiments and over a thousand questions are included. Fifteen chapters are given to the following subjects: (1) "Atmospheric Moisture and Evaporation," (2) "Moisture Coming from the Atmosphere," (3) "The Atmosphere," (4) "Transmission of Heat," (5) "Expansion and Heat Measurement," (6) "Oxidation and Its Relation to Life," (7) "Food and Medicine," (8) "Water," (9) "Germs and Disease,' (10) "Light and Its Relation to the World," (11) "Electricity," (12) "The Relation of Sound and Music to Us," (13) "The Universe," (14) "Machines and Work," (15) "Safety First."

C. ARTICLES OF ESPECIAL INTEREST

Space does not permit comments on the large number of excellent articles which have appeared during the past year. It may be of value, however, to list under separate classifications those articles which, in the opinon of the writer, are of particular interest.

1. ORGANIZATION OF GENERAL SCIENCE COURSES

BARBER, FRED B., "Fundamental Considerations in the Reorganization of High-School Science," *General Science Quarterly*, I, 102–11.

CARPENTER, HARRY A., "General Science in the Junior High School at Rochester, New York," Part II, Course of Study, *General Science Quarterly*, II, 255–66.

HUNTINGTON, E. D., "Elementary Science or General Science," *School Science and Mathematics*, XVII, 47–52.

JOHNSON, A. C., "The Selection and Arrangement of Materials in a General Science Course," *General Science Quarterly*, I, 83–88.

KELLY, H. C., "The Springfield Plan," *General Science Quarterly*, I, 191–200.

PATTON, L. M., "An Experiment in Eighth-Grade Science," *General Science Quarterly*, I, 73–82.

Report of Committee of North Central Association of Colleges and Secondary Schools on the Reorganization of the High School and Definition of Unit Proceedings, XXI, 171.

2. PRESENT CONDITIONS IN GENERAL SCIENCE

HARTMAN, CARL, "The General Science Situation in Texas," *School Science and Mathematics*, XVII, 141–46.

MARION, S. J., "The Status of Science Work in the High Schools of North Carolina," *North Carolina High School Bulletin*, VIII, 137–42.

RUCH, G. M., "The General Science Situation in Oregon," *General Science Quarterly*, I, 126–27.

RUSTERHOLTZ, J. H., "The Present Status of General Science in High Schools of Pennsylvania," *General Science Quarterly*, I, 223–27.

WHITMAN, W. G., "Credit for High-School General Science in Higher Institutions," *General Science Quarterly*, II, 301–3.

WORUN, A. A., "General Science in Michigan," *General Science Quarterly*, II, 267–84.

3. METHOD IN THE TEACHING OF GENERAL SCIENCE

BROWNELL, H., "Some of the Pedagogy of General Science," *General Science Quarterly*, II, 140–45.

DEWEY, JOHN, "Method in Science-Teaching," *Jour. N.E.A.*, I, 725–30.

DOWNING, E. R., "Supervised Study and the Science Laboratory," *School Review*, XXV, 646–51.

MILLER, G. R., "An Applied Science Shop in the Junior High School," *General Science Quarterly*, II, 297–98.

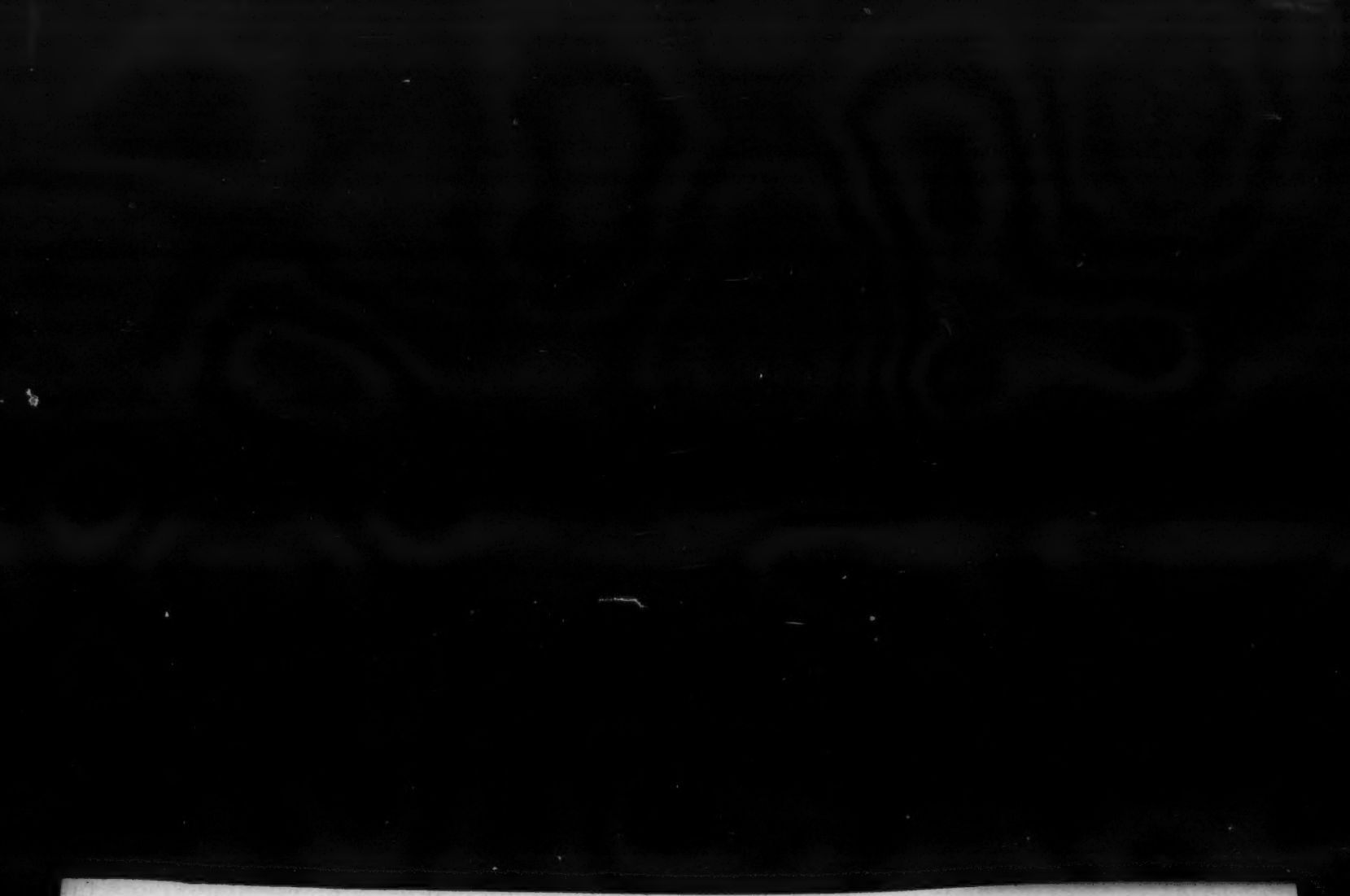
WOODHULL, J. F., "Aims and Methods of Science Teaching," *General Science Quarterly*, II, 267–84.

III. CURRENT EDUCATIONAL PUBLICATIONS RECEIVED IN APRIL, 1918

A. GENERAL EDUCATIONAL THEORY AND PRACTICE

EARHART, WILL, AND OTHERS. *Music in Secondary Schools.* United States Bureau of Education, Bulletin No. 49. Washington: Government Printing Office, 1917. Pp. 37.

FLEXNER, ABRAHAM. *General Education Board, Report of the Secretary, 1916–1917.* New York: The General Education Board. Illustrated. Pp. x+92.

JONES, W. FRANKLIN. *A Study of Handedness.* University of South Dakota: Vermilion, S.D. Pp. 80.

Public School Bulletin No. 1. Board of Education, Richmond, Ind., 1917.